

Cardiopulmonary resuscitation during COVID-19 times....Time to recover and emerge stronger!

Submitted: 12-Feb-2022

Revised: 13-Feb-2022

Accepted: 13-Feb-2022

Published: 24-Feb-2022

Sukhminder Jit Singh Bajwa, Lalit Mehdiratta¹

Department of Anaesthesiology and Intensive Care, Gian Sagar Medical College and Hospital, Patiala, Punjab, ¹Anaesthesiology, Critical Care and Emergency Medicine, Narmada Trauma Centre, Bhopal, Madhya Pradesh, India

Access this article online
Website: www.ijaweb.org
DOI: 10.4103/ija.ija_153_22
Quick response code


Address for correspondence: Dr. Sukhminder Jit Singh Bajwa,

Department of Anaesthesia and Intensive Care, Gian Sagar Medical College and Hospital, Banur, Patiala - 140 506, Punjab, India.

E-mail: drsukhminder_bajwa2001@yahoo.com

The very thought of coronavirus disease (COVID)-19 reminds us of the morbidity and mortality statistics associated with it. As the dark clouds of COVID-19 loomed over the globe, cardiac arrest and death became very common, both inside and outside hospital.^[1] During this COVID-19 period, hospitals including intensive care units were overwhelmed. Healthcare workers (HCWs) were trying to save other's lives fearing for their own. Hypoxia and acidosis secondary to acute respiratory distress syndrome and cardiovascular complications including myocarditis, myocardial injury, ischaemic heart disease, arrhythmias, thrombo-embolic events, and cardiogenic shock are the common causes of cardiopulmonary arrest in COVID-19 patients.^[2]

In the pre-COVID-19 era, cardio-pulmonary resuscitation (CPR) was offered straight away and without hesitation to all patients in cardiac arrest. But CPR in COVID-19 times has changed its face. It has become a high risk procedure, mainly because many of its components are highly aerosol generating procedures (AGPs) and the risk of CPR to the HCW is very high.^[3] CPR in suspected or confirmed COVID-19 patients needs a modified approach compared to the conventional CPR technique. Several official bodies and organisations have published their guidelines and protocols for basic and advanced

cardiac life support in COVID-19 patients. Notable amongst these are the ones issued by the European Resuscitation Council (ERC), the American Heart Association, the International Liaison Committee on Resuscitation, the Indian Society of Critical Medicine and the Indian Resuscitation Council (IRC).^[3-7] Various modifications were made in the existing CPR protocols to suit the COVID-19 scenarios. Prominent amongst these include wearing a personnel protective equipment (PPE) kit before attempting CPR, use of mechanical chest compression devices, only visual assessment of breathing, use of high efficiency particulate air (HEPA) filters, early connection to mechanical ventilator, use of closed circuit and closed in-line suction, communication of patient's COVID-19 status to newly entered CPR providers, avoidance of bag and mask ventilation, CPR strategies in the prone position and use of anticoagulants in the post-arrest care.^[3-8]

EPIDEMIOLOGY OF CARDIAC ARRESTS IN COVID-19

The initial days of the COVID-19 pandemic saw most cardiac arrests occurring in the home-setting with friends and family members as first responders. Diagnosed/suspected cases of COVID-19 accounted for 25.5% of out-of-hospital cardiac arrest (OHCA) in 2020. There was an excess of OHCA cases during

the pandemic with one-third of the excess accounted for by suspected COVID-19 cases and an increase in the incidence of emergency medical services (EMS) calls for COVID-19 symptomatic patients.^[9-11] The median time taken to provide EMS was longer and number of patients who received bystander CPR was less.^[9] Surveys have shown that outbreaks of infectious diseases such as COVID-19 have negative impacts on the attitudes and behaviour towards bystander CPR.^[12] All this could have contributed to the increase in COVID-19 deaths. Most of the in-hospital cardiac arrests (IHCA) occurred in general wards, with respiratory arrest being the most common, and the initial rhythms being mostly non-shockable.^[13] The reported return of spontaneous circulation (ROSC) rates are very low both in OHCA and IHCA in COVID-19 cases, with an estimated overall mortality rate of 89.9% in IHCA.^[10,11,14,15] A huge difference in the pattern of cardiac arrest and the outcomes of CPR in COVID-19 cases is thus clearly visible.

SEARCH FOR THE CAUSE FOR POOR CPR OUTCOMES

The low ROSC rates in IHCA COVID-19 cases leave us groping helplessly in search of the possible reasons for the dismal outcomes of CPR. Are the poor outcomes related to the delay in starting CPR because of the time taken to don^[16] or the delay in the recognition of cases that are likely to require CPR? Is it that the cause of cardiac arrest is unclear in most COVID-19 cases, with hypoxia, acidosis, electrolyte imbalance, and non-shockable rhythms and this contributes to the poor outcomes? It is advised by all the bodies that 'High Quality CPR' should be provided in all COVID-19 cardiac arrest patients for good outcomes.^[3,4,7] In fact, high quality chest compressions form the crux of CPR; this issue of the *Indian Journal of Anaesthesia (IJA)* has a study wherein the authors have assessed the quality of CPR being offered in a tertiary care hospital with the help of parameters like chest compression fraction.^[17] But are we really able to provide this kind of high quality CPR in COVID-19 cases? The answer is 'Not really!' An anxiety struck HCW fearing infection from the patient, fatigued, and tired out easily during CPR cannot provide high-quality CPR and we have to accept this truth. COVID-19 times have been mentally and physically exhausting to HCWs.^[18,19] The PPE including heat-stress producing, ill-fitting PPE gowns, the fogging goggles and difficulty in communication can play havoc with CPR manoeuvres like chest compression and airway management, though several

innovations, and modifications have been devised.^[20-22] Barrier devices like the aerosol box have conflicting evidence on their utility and they may prove to be practically not useful or even cause a hindrance in the process.^[23-25] A study being published in this issue of the *IJA* has shown the non-utility of the aerosol box in central venous cannulation in COVID-19 cases.^[26] Could it be that the clinical dilemmas and confusion posed by the guidelines of multiple bodies have led to the poor CPR performance? The divergent recommendations and the resultant dilemmas posed are many. The use of mechanical chest compression device is an important common recommendation of all the bodies; unfortunately it is not available in all locations. Nonetheless, it is necessary that every member of the resuscitation team should follow the same guidelines. This can be made possible if guidelines and protocols framed by different bodies are uniform. Further, their adoption as per local resources can reduce the confusion and dilemmas. However, to make these guidelines, more evidence is needed and this evidence can only be provided by research.

RESEARCH ON CPR IN COVID-19 TIMES

COVID-19 has provided enough food for research, taught us the value of research, and posed various challenges to researchers.^[27,28] There are several aspects of CPR which need to be researched upon. There is currently scarce research on methods to reduce contamination during CPR.^[29] Studies on COVID-19 infection acquired by HCWs during CPR, psychological issues in HCWs performing CPR, outcomes of CPR in IHCA in COVID-19 cases in India and many more such aspects need to be investigated. The evidence about chest compressions and defibrillation being AGPs and the quantity of aerosols generated by them is currently weak and research on this would be warmly welcomed.

There is not much evidence on CPR in prone patients. In an e-survey in Spain, only 5% responders had conducted CPR in the prone COVID-19 patient.^[2] A study found that performing CPR in the prone patient produced higher mean arterial pressure readings than in the supine patients.^[30] All the guidelines have recommended doing chest compressions in the prone position in an already intubated patient and turning patient to supine if not intubated. Nevertheless, airway management in the prone position and improving the effectiveness of chest compressions in the prone patient are fields worthy of further research and improvement.

Use of long defibrillator cables that can enable rhythm monitoring by an external team, use of ventilators which allow the cable to be separated by a long distance from the ventilator to allow remote management, teleconferencing to facilitate communication between providers inside and outside the CPR room, use of remote titration of sedation, and vasoactive medications by coupling infusion pumps and microbore extension tubing are other suggested steps in CPR technique in COVID-19 cases that deserve to be researched upon.^[31]

ETHICAL ISSUES IN COVID-19 CPR

Ethical issues in CPR in COVID-19 cases are causes for concern. Healthcare administrators have in the course of the pandemic called for not resuscitating patients with poor prognosis, especially because this will save HCWs who are precious resources from getting infected and going into isolation and this will benefit society at large.^[8] A utilitarian approach has been recommended wherein CPR adjuncts like PPE, ventilators, extracorporeal membrane oxygenation circuits, and health care personnel are allocated to the COVID-19 patients with best prognosis. As per utilitarian ethics, CPR is delayed until the HCW dons the appropriate PPE, though it is known that a delay in CPR results in a decrease in rate of survival.^[31] Nevertheless, the ERC recommends that only when resources are truly lacking in a region, prioritisation of healthcare resources must be done based on individual patient evaluation and not by category like age, profession, etc.^[4] Nonetheless, studies and systematic reviews on the outcomes of treatment and CPR in COVID-19 cases can help in making future policies on prioritisation of treatment.

An open discussion with the COVID-19 patients and their relatives about the goals of care, the prognosis, and the options available, including possibility of CPR and intubation can sort out many problems. It is an observation in the course of the pandemic that patients' relatives after coming to know about the unfavourable outcomes of mechanical ventilation and CPR often refuse these manoeuvres, especially in aged patients with multiple co-morbidities and severe COVID-19. Here again, talking to the patients' relatives in quarantine becomes a daunting task. Thus, ethical decision-making in CPR and COVID-19 cases poses various challenges and the ERC has even suggested the formation of 'ethics teams' to support decision-making.^[4]

CPR TRAINING IN COVID-19 TIMES

CPR was in huge demand in the past two years both in and out-of-hospital and many patients had to receive CPR from untrained and non-certified personnel. CPR in COVID-19 times has never been the same as it had been before. CPR training programmes have suffered and not many have taken place because of CPR hesitation trends and social distancing protocols during the pandemic. The time has come for CPR training to be renewed vigorously. Online/video training programmes have become the new norm during the pandemic and CPR training can be imparted virtually with virtual simulation.^[32-34]

According to a systematic literature review, trainees who have received only online training perform better in assessing scene safety, calling for help, response-time including initiating first rescue breathing, adequate ventilation volumes, compression rates, confidence, and knowledge retention compared to those who have received standard in-person CPR. Those who have received in-person CPR perform better in hand placement and chest compression depth.^[35] Performing chest compressions in the prone position, holding fruitful end-of-life discussions, making quality and quick use of mechanical compression devices, delivering quality CPR with good team coordination and communication without losing PPE integrity and in difficult clinical scenarios of COVID-19 should be taught regularly in all CPR workshops.

COVID-19 is here to stay and we have to adapt to it by aptly modifying our health care services and training programmes. It is time that the IRC and the newly formed IRC Federation take up CPR training on a wider scale to make up for the training time lost during COVID-19 times and also make CPR in the COVID-19 patient a compulsory part of every CPR training programme.

The IRC aims to train every citizen including school children in CPR. 'Young Resuscitators Network' is a training programme to be initiated by the IRC wherein school children trained in CPR impart CPR training to other school children and this cycle will continue from school to school.^[36] A study in this issue of the *IJA* is based on CPR training in school children, wherein Hands-Only CPR training was imparted to 414 8th grade high school students in a city and the training was found to be effective.^[37] Studies like this depict that the future of CPR in India is not just

bright; it is sparkling. We can confidently assume that the bright light of the knowledge and skill of CPR will certainly shove away the dark clouds of death and COVID-19 deaths. For this, we have to continue our CPR training efforts with firm commitment and enthusiasm because, as it is always said, great rewards always come with great efforts.

REFERENCES

- Samantaray A, Johnson E, Kumar N, Mehdiratta L. COVID-19: A game of drugs, vaccines, hope and... death! *Indian J Anaesth* 2021;65:434-8.
- Aliaño Piña M, Ruiz Villén C, Galán Serrano J, Monedero Rodríguez P. Resucitación cardiopulmonar durante la pandemia por COVID-19 en España. *Rev Esp Anestesiol Reanim* 2021;68:437-42.
- Kulkarni AP, Singh Y, Garg H, Jha S. Cardiopulmonary resuscitation during COVID-19 pandemic: outcomes, risks, and protective strategies for the healthcare workers and ethical considerations. *Indian J Crit Care Med* 2020;24:868-72.
- European Resuscitation Council COVID-19 Guidelines. Available from: https://cms.erc.edu/sites/5714e77d5e615861f00f7d18/pages/5e9ac62b4c84867335e4d1eb/files/ERC_covid19_spreads.pdf?1609938873. [Last accessed on 2022 Feb 10].
- ILCOR practical guidance for implementation – COVID 19. Available from: <https://www.ilcor.org/covid-19>. [Last accessed on 2022 Feb 10].
- Atkins DL, Sasson C, Hsu A, Azi K, Becker LB, Berg RA, *et al*. 2022 Interim Guidance to Healthcare Providers for Basic and Advanced Cardiac Life Support in Adults, Children, and Neonates with Suspected or Confirmed COVID-19: From the Emergency Cardiovascular Care Committee and Get With the Guidelines®-Resuscitation Adult and Pediatric Task Forces of the American Heart Association in Collaboration with the American Academy of Pediatrics, American Association for Respiratory Care, The Society of Critical Care Anesthesiologists, and American Society of Anesthesiologists. Available from: <https://www.ahajournals.org/doi/epdf/10.1161/CIRCOUTCOMES.122.008900>. [Last accessed on 2022 Feb 10].
- Singh B, Garg R, Chakra Rao SS, Ahmed SM, Divatia JV, Ramakrishnan TV, *et al*. Indian resuscitation council (IRC) suggested guidelines for comprehensive cardiopulmonary life support (CCLS) for suspected or confirmed coronavirus disease (COVID-19) patient. *Indian J Anaesth* 2020;64:S91-6.
- Kundra P, Vinayagam S. COVID-19 cardiopulmonary resuscitation: Guidelines and modifications. *J Anaesthesiol Clin Pharmacol* 2020;36:S39-44.
- Baldi E, Sechi GM, Mare C, Canevari F, Brancaglione A, Primi R, *et al*. Out-of-hospital cardiac arrest during the Covid-19 outbreak in Italy. *N Engl J Med* 2020;383:496-8.
- Marijon E, Karam N, Jost D, Perrot D, Frattini B, Derkenne C, *et al*. Out-of-hospital cardiac arrest during the COVID-19 pandemic in Paris, France: A population-based, observational study. *Lancet Public Health* 2020;5:e437-43.
- Lai PH, Lancet EA, Weiden MD, Webber MP, Owens RZ, Hall CB, *et al*. Characteristics associated with out-of-hospital cardiac arrests and resuscitations during the novel coronavirus disease 2019 pandemic in New York City. *JAMA Cardiol* 2020;5:1154-63.
- Chong K-M, Chen J-W, Lien W-C, Yang M-F, Wang H-C, Liu SS-H, *et al*. Attitude and behaviour towards bystander cardiopulmonary resuscitation during COVID -19 outbreak. *PLoS One* 2021;16:e0252841.
- Shao F, Xu S, Ma X, Xu Z, Lyu J, Ng M, *et al*. In-hospital cardiac arrest outcomes among patients with COVID-19 pneumonia in Wuhan, China. *Resuscitation* 2020;151:18-23.
- Chan PS, Girotra S, Tang Y, Al-Arji R, Nallamothu BK, McNally B, *et al*. Outcomes for out-of-hospital cardiac arrest in the United States during the coronavirus disease 2019 pandemic. *JAMA Cardiol* 2021;6:296-303.
- Ippolito M, Catalisano G, Marino C, Fuca R, Giarratano A, Baldi E, *et al*. Mortality after in-hospital cardiac arrest in patients with COVID-19: A systematic review and meta-analysis. *Resuscitation* 2021;164:122-29.
- Watson L, Sault W, Gwyn R, Verbeek PR. The “delay effect” of donning a gown during cardio-pulmonary resuscitation in a simulation model. *CJEM* 2008;10:333-8.
- Maddani SS, Chaudhuri S, Krishna HM, Rao S, Unnithan NH, Ravindranath ST. Evaluation of the quality of cardiopulmonary resuscitation provided by the emergency response team at a tertiary care hospital. *Indian J Anaesth* 2022;66:126-32.
- Jain A, Singariya G, Kamal M, Kumar M, Jain A, Solanki RK. COVID-19 pandemic: Psychological impact on anaesthesiologists. *Indian J Anaesth* 2020;64:774-83.
- Sharma R, Saxena A, Magoon R, Jain MK. A cross-sectional analysis of prevalence and factors related to depression, anxiety, and stress in health care workers amidst the COVID-19 pandemic. *Indian J Anaesth* 2020;64:242-4.
- Bajwa SJ, Kurdi M, Malhotra N. Combating the COVID-19 battle with personal protective equipment (PPE) armamentarium. *J Anaesthesiol Clin Pharmacol* 2020;36:S133-6.
- Ramamoorthy KG. Anti-fogging techniques as part of personal protective equipment (PPE). *Indian J Anaesth* 2020;64:1085-6.
- Saha S. A do-it-yourself video laryngoscope for endotracheal intubation of COVID-19 positive patient. *Indian J Anaesth* 2020;64:904-5.
- Katiyar R, Katiyar S, Acharya G, Yadava A. Impact of aerosol box on anxiety of the anaesthesiologist for intubation during COVID19 pandemic: A single blinded observational study. *Indian J Anaesth* 2021;65:554-6.
- Venketeswaran MV, Srinivasaraghavan N, Balakrishnan K, Seshadri RA, Sriman S. Intubation outcomes using the aerosol box during the COVID-19 pandemic: A prospective, observational study. *Indian J Anaesth* 2021;65:221-8.
- Puthenveetil N, Rahman S, Vijayaraghavan S, Suresh S, Kadapamannil D, Paul J. Comparison of aerosol box intubation with CMAC video laryngoscope and direct laryngoscopy—A randomised controlled trial. *Indian J Anaesth* 2021;65:133-8.
- Sertcakacilar G, Bayrak SK, Pektas Y, Bostanci I, Yildiz GO, Sabaz MS. Evaluation of aerosol box use for ultrasound-guided internal jugular vein cannulation in patients with COVID-19: A short-term randomised study. *Indian J Anaesth* 2022;66:112-8.
- Mehdiratta L, Bajwa SJ, Kurdi MS, Bhattacharya PK. Research in COVID times—Innovations, revolutions and contentions. *Indian J Anaesth* 2021;65:277-81.
- Bajwa SJ, Mehdiratta L. Research and COVID-19: Losing momentum every now and then. *Indian J Anaesth* 2021;65:508-11.
- George LR, George SE, Dhawan I, Babu M, Sahajanandan R, Joselyn AS. Simulation with a colour indicator to help reduce contamination during airway management in COVID19 times: An experience from a tertiary centre in India. *Indian J Anaesth* 2021;65:820-9.
- Mazer SP, Weisfeldt M, Bai D, Cardinale C, Arora R, Ma C, *et al*. Reverse CPR: A pilot study of CPR in the prone position. *J Resuscitation* 2003;57:279-85.
- Cheruku S, Dave S, Goff K, Park C, Ebeling C, Cohen L, *et al*. Cardiopulmonary resuscitation in intensive care unit patients with coronavirus disease 2019. *J Cardiothorac Vasc Anesth* 2020;34:295-603.
- Gupta B, Jain G, Mishra P, Pathak S. Preparedness to combat COVID-19 via structured online training program regarding specific airway management: A prospective observational study. *Indian J Anaesth* 2020;64:796-9.
- Gautam S, Shukla A, Mishra N, Kohli M, Singh GP. Effectiveness

- of virtual training for medical officers and community health officers in the critical care management of COVID19 patients in the intensive care unit. *Indian J Anaesth* 2021;65:168-73.
34. Mouli TC, Davuluri A, Vijaya S, Priyanka AD, Mishra SK. Effectiveness of simulation based teaching of ventilatory management among non-anaesthesiology residents to manage COVID 19 pandemic-A quasi experimental cross sectional pilot study. *Indian J Anaesth* 2020;64(Suppl 2):S136-40.
35. Ali DM, Hisam B, Shaukat N, Baig N, Ong ME, Epstein JL, *et al.* Cardiopulmonary resuscitation (CPR) training strategies in the times of COVID-19: A systematic literature review comparing different training methodologies. *Scand J Trauma Resusc Emerg Med* 2021;29:53.
36. Shah T. How COLS- Compression Only Life Support-training can be imparted in schools. *The Lifesaver. Official Newsletter of Indian Resuscitation Council* 2021;1:31. Available from: <https://cprindia.in/assets/pdf/IRC-Newsletter-The-Lifesaver-Vol1.pdf>. [Last accessed on 2022 Jan 12].
37. Ramesh AC, Hariprasad KV, Abhishek KB, Murthy MR, Edison M, Hoek TL. Teaching Hands-Only CPR (HOCPR) skills to 8th-grade students in urban Bengaluru: Development of a comprehensive Hands-Only CPR programme for high school students. *Indian J Anaesth* 2022;66:140-5.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

How to cite this article: Bajwa SJS, Mehdiratta L. Cardiopulmonary resuscitation during COVID -19 times....Time to recover and emerge stronger! *Indian J Anaesth* 2022;66:95-9.

Announcement

Old Issues of IJA

Limited copies of old issues of IJA from 2013 are available in IJA office. Members interested can contact Immediate Past Editor In Chief (editorija@yahoo.in/ijadivatia@gmail.com / 98690 77435)