Risk of SARS-CoV-2 Infection among Healthcare Providers Involved in Cardiopulmonary Resuscitation in COVID-19 Patients

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Abstract

Cardiopulmonary resuscitation (CPR) is considered an aerosol-generating procedure. The aim of this study was to identify the risk of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection among healthcare providers (HCPs) involved in CPR in coronavirus 2019 (COVID-19) patients. An online and offline anonymous survey with a preformed questionnaire was conducted among the HCPs involved in the care of COVID-19 patients. HCPs who developed reverse transcription-polymerase chain reaction-positive confirmed COVID-19 and/or symptomatic influenza-like illness (ILI) within 14 days of their involvement in CPR of a confirmed COVID-19 patient were identified. Activities performed during CPR, the cumulative number of CPR performed, any breach in personal protective equipment (PPE), type of the mask used, use of any pharmacological prophylaxis, and any psychological impact among HCPs were also identified.

A total of 393 HCPs participated in the survey; out of them, 197 HCPs participated in CPR at least once (CPR group) and the rest 196 did not (control group). Ten in the control group and five in the CPR group developed confirmed COVID-19 within the next 2 weeks; however, only one of these five had a breach in PPE during CPR. To conclude, participation in CPR does not increase the risk of SARS-CoV-2 infection in HCPs caring for the COVID-19 patients.

Keywords: Cardiopulmonary resuscitation, Coronavirus disease 2019, Healthcare workers, severe acute respiratory syndrome coronavirus 2.

Ethics approval and consent to participate: The study was approved by the ethics committee of the All India Institute of Medical Sciences, New Delhi, vide letter number: IEC-676/03.07.2020, dated July 4, 2020.

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Healthcare professionals (HCPs) are considered at risk of getting infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) during aerosol-generating procedures like intubation, ventilation, and cardiopulmonary resuscitation (CPR). However, in a systematic review, Couper et al. concluded that it is uncertain whether chest compressions or defibrillation causes transmission of SARS-CoV-2 to the HCPs.[1]

We conducted an online and offline cross-sectional anonymous questionnaire survey among all HCPs regularly working in coronavirus 2019 (COVID-19) designated areas of AIIMS, New Delhi, between August 3 and August 24, 2020, after Institutional Ethics Committee (IEC-676/03.07.2020) approval to identify the incidence and risk factors for SARS-CoV-2 infection. Those who refused to participate or started working in the COVID-19 facility for the first time in the last 7 days were excluded. Definition of COVID-19 suspect, confirmed case of COVID-19, and testing strategy were kept as per the National Guideline of Government of India.[2] Statistical analysis was done by SPSS statistical software (IBM SPSS 26.0. Armonk, New York: IBM Corp.).

A total of 393 HCPs participated in the survey; of them,197 HCPs participated in CPR (CPR group) and the rest 196 did not (control group). Ten in the control group and five in the CPR group developed confirmed COVID-19 within the next 2 weeks; however, only one of these five had a breach in personal protective equipment (PPE) during CPR. (Table 1) Nearly, 32.06% of HCPs reported a history of contact with a confirmed COVID-19 person in the family or workplace. Workplace exposure to colleagues was more common (85.7%), followed by exposure in family or neighborhood. This was similar to the World Health Organization-China report where the majority of the HCPs who turned SARS-CoV-2 positive had been traced to have a contact at home.[3]

In the SARS pandemic, critical care nurses involved in suctioning of endotracheal tubes and manipulating the face mask of patients were four times more infected.[4] Small volume of airflow during chest compressions and tonic muscle spasms during defibrillation potentially generate aerosols. We found that performing CPR wearing appropriate PPEs does not increase the chance of infection among HCPs. Moreover, neither the cumulative number of CPRs performed nor the type of activity performed during CPR increased the risk of infection. Therefore, PPE should be considered to have a definite protective role. N-95 mask is an integral component of

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Table 1: Participant characteristics, CPR, infection rate, and other outcome data ($n = 393$)

Characteristics	*Data*		
Age (mean ± SD)	31.29 ± 6.37		
Sex: *n* (%)			
Female	129 (32.8%)		
Male	264 (67.2%)		
Type of staff:			
Faculty	27 (7%)		
Residents	275 (70%)		
Nursing officers	41 (10.4%)		
Technicians	36 (9 %)		
Others	14 (3.6%)		
Duration of posting at the time of survey:			
>7 days	14 (3.56%)		
7–30 days	114 (29%)		
1–2 months	93 (26.6%)		
>2 months	173 (44%)		
Parameters [*n* (%)]	CPR group ($n = 197$)	Control group ($n = 196$)	Significance (*p* value)
Confirmed COVID-19 (Yes/No)	5 (2.53%)	10 (5.10%)	NA
ILI within 14 days of CPR	9 (4.56%)	NA	NA
ILI within 14 days of posting in COVID-19 area	30 (15.22%)	35 (17.85%)	$p = 0.512^{£}$
History of breach in PPE during CPR	5 (2.53%)	NA	NA
History of breach in PPE during other time of posting in COVID-19 area	60 (30.4%)	21 (10.71%)	$p = 0.000^{£}$
History of contact with a confirmed case in family/community	64 (32.48%)	62 (31.63%)	$p = 0.856^{£}$
HCQS prophylaxis	84 (42.63%)	69 (35.20%)	$p = 0.131^{£}$
Feeling of masks/goggles slipping away during CPR	76 (38.57%)	NA	NA
Activities performed during CPR		NA	NA
Bag-mask ventilation	79 (40.10%)		
Intubation	68 (34.51%)		
Assisted intubation	77 (39.08%)		
Chest compression	150 (76.14%)		
Defibrillation	58 (29.44%)		
Injected drugs	84 (42.63%)		
Cumulative number of CPR performed		NA	NA
1	47		
2–3	87		
>3	63		

£-Chi-square test

the PPE. N-95 masks have been shown to reduce the risk by 80% in a study during a SARS outbreak.[5] However, we did not find any superiority of any type of N-95 mask (either cup-shaped with or without the valve or foldable type) over another.

There has been reported slipping of mask and goggles during chest compressions, which requires readjustment.[6] In our series, 34.6% of HCPs reported the subjective feeling of masks and goggles slipping away during CPR, although actual breach was rare. However, this may mislead the HCPs, create panic, and affect the CPR performance. Moreover, this calls for better make and fitting of masks and goggles. In our unit, CPR was performed based on the American Heart Association guidelines for CPR. All HCPs were donned in level 3 PPE, with an early intubation to minimize the amount of aerosols generated, use of two-hand mask ventilation to prevent air leaks, and use of video laryngoscopes for intubations.[7]

Our survey revealed that 40% of HCPs took hydroxychloroquine (HCQ) prophylaxis. However, there was no decrease in the positivity rate for SARS-CoV-2 in HCPs who took HCQ prophylaxis. Five out of 10 HCPs who developed COVID-19 in the control group and all the five HCPs who developed COVID-19 in the CPR group were on HCQS prophylaxis. The average duration of HCQ prophylaxis during the survey was 2.5 ± 4.10 weeks. One RCT was prematurely terminated due to the lack of any clinical benefit of HCQS as preexposure prophylaxis.[8] On the contrary, the Indian Council Medical Research (ICMR) advised for its use.[9]

Psychological impact was observed as depression in 5.09%, anxiety in 10.6%, and sleeplessness in 14.75% of HCPs. SARS-CoV-2 has a huge psychological impact, including fear of transmission to family members being one of the biggest.[10]

This is the first study that attempted to identify the SARS-CoV-2 infection rate among HCPs involved in CPR in COVID-19 patients and gathered the objective data on reverse transcription-polymerase chain reaction-positive infection rate, influenza-like illness (ILI) symptoms, HCQ prophylaxis, the incidence of the breach in PPE, and psychological impact. To conclude, participation in CPR with

appropriate PPEs does not increase the risk of SARS-CoV-2 infection in HCPs caring for the COVID-19 patients.

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References

1. Couper K, Taylor-Phillips S, Grove A, Freeman K, Osokogu O, Court R, et al. COVID-19 in cardiac arrest and infection risk to rescuers: a systematic review. Resuscitation 2020;151:59–66. DOI: 10.1016/j.resuscitation.2020.04.022.
2. EMR Division Directorate General of Health Services Ministry of Health and Family Welfare. Revised national clinical management guideline for COVID-19. 2020.
3. World Health Organization. Aylward B (WHO), Liang W (PRC). Report of the WHO-China joint mission on coronavirus disease 2019 (COVID-19). 2020;2019(February):16–24. Available from: https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf.
4. Loeb M, McGeer A, Henry B, Ofner M, Rose D, Hlywka T, et al. SARS among Critical Care Nurses, Toronto. Emerg Infect Dis 2004;10(2):251–255. DOI: 10.3201/eid1002.030838.
5. Riou J, Althaus CL. Pattern of early human-to-human transmission of Wuhan 2019 novel coronavirus (2019-nCoV), December 2019 to January 2020. Euro Surveill 2020;25(4):2000058. DOI: 10.2807/1560-7917.ES.2020.25.4.2000058.
6. Abrahamson SD, Canzian S, Brunet F. Using simulation for training and to change protocol during the outbreak of severe acute respiratory syndrome. Crit Care 2005;10(1):R3. DOI: 10.1186/cc3916.
7. Edelson DP, Sasson C, Chan PS, Atkins DL, Aziz K, Becker LB, et al. Interim guidance for basic and advanced 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. Circulation 2020;141(35):e933–e943. DOI: 10.1161/CIRCULATIONAHA.120.047463.
8. Abella BS, Jolkovsky EL, Biney BT, Uspal JE, Hyman MC, Frank I, et al. Efficacy and safety of hydroxychloroquine vs placebo for pre-exposure SARS-CoV-2 prophylaxis among health care workers: a randomized clinical trial. JAMA Intern Med 2020;1–8. DOI: 10.1001/jamainternmed.2020.6319.
9. Indian Council of Medical Research. ICMR. Revised advisory on the use of HCQ as prophylaxis for SARS-CoV-2. 2020. p. 2–5.
10. Khan S, Siddique R, Li H, Ali A, Shereen MA, Bashir N, et al. Impact of coronavirus outbreak on psychological health. J Glob Health 2020;10(1):1–6. DOI: 10.7189/jogh.10.010331.