BJGP British Journal of General Practice

Cardiopulmonary resuscitation with chest compressions alone: Time to review our approach in primary and community care?

Journal:	*British Journal of General Practice*
Manuscript ID	BJGP-2020-0605.R1
Manuscript Type:	Editorial
Date Submitted by the Author:	07-Jul-2020
Complete List of Authors:	Khunti, Kamlesh; University of Leicester, Straube , Sebastian ; University of Alberta Faculty of Medicine and Dentistry Adisesh, Anil; University of Toronto, Medicine Chan , Xin Hui; University of Oxford, Centre for Tropical Medicine and Global Health Banerjee , Amitava; University College London Greenhalgh, Trish; Nuffield Department of Primary Care Health Sciences
Keywords:	Respiratory illness < Clinical (physical)

Cardiopulmonary resuscitation with chest compressions alone: Time to review our approach in primary and community care?

Kamlesh Khunti, Sebastian Straube, Anil Adisesh, Xin Hui Chan, Amitava Banerjee, Trish Greenhalgh

Kamlesh Khunti FRCGP FRCP FMedSci, Professor of Primary Care Diabetes & Vascular Medicine, Diabetes Research Centre, University of Leicester, UK

Sebastian Straube, BM BCh, MA (Oxon), DPhil, Professor and Division Director, Division of Preventive Medicine, Department of Medicine, University of Alberta, Edmonton, Alberta, Canada

Anil Adisesh, MB ChB, MSc, MD, FRCP, FFOM, FRCPC, Associate Professor and Division Director, Occupational Medicine, Department of Medicine, University of Toronto and St. Michael's Hospital, Canada

Xin Hui Chan, BMBCh MA MSc DPhil MRCP DTM&H, Clinical Research Fellow, Centre for Tropical Medicine and Global Health

Dr Amitava Banerjee MA MPH DPhil FHEA FAHA FESC FRCP
Associate Professor in Clinical Data Science and Honorary Consultant Cardiologist, Institute of Health Informatics, University College London, UK

Trisha Greenhalgh MD, Professor of Primary Care Health Sciences, Nuffield Department of Primary Care Health Sciences, University of Oxford, Radcliffe Observatory Quarter, Woodstock Road, Oxford, UK

Word count: 841

Correspondence to:

K Khunti, University of Leicester, Diabetes Research Centre, Leicester, LE5 4PW, UK,
email:kk22@le.ac.uk, Phone: +44 116 258 4005

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes coronavirus disease 2019 (COVID-19), can be spread by droplets or aerosols, particularly through direct or close contact and aerosol generating procedures (AGPs). (1) Supplies of personal protective equipment (PPE)(2) are limited, raising uncertainties in clinical judgement about the balance between benefit (to the patient) and risk (to the healthcare worker) during medical procedures such as cardiopulmonary resuscitation (CPR) undertaken without adequate protection during the COVID-19 pandemic. Lack of PPE has caused intense anxiety in view of the increased number of deaths in healthcare workers including in primary and community care. (2)

CPR can be a complex intervention comprising airway management, ventilation, chest compressions, drug therapy, and defibrillation. (3) Whilst the intubation component of CPR is almost universally classified as an AGP, there is controversy around the risk of chest compression (to the person performing it, and to other staff and bystanders). (4)

Risks to health care workers will vary depending on the setting where such individuals work (primary or community care versus hospital-based care), and whether the individual works in an environment where AGPs are performed. The key concern for health care professionals is based on the possibility of aerosol generation with chest compressions and the risks associated with close physical contact with the patient. In addition, others who aid in the CPR effort such as in primary or community care setting, even if not performing chest compressions themselves, may be in close physical proximity to be exposed as bystanders. Confusion has arisen because of varied guidance on CPR in different regions. For example, health care staff in one UK region were told not to start chest compressions or ventilation in patients having a cardiac arrest if they had either confirmed or suspected COVID-19 unless staff were wearing full (i.e. aerosol and droplet protective) PPE including a respirator mask (FFP3 mask), full gown with long sleeves, gloves and eye protection.(5)

Public Health England (PHE) have issued various guidance documents on PPE since January 2020.(6) Initial guidance suggested that chest compressions and defibrillation were not AGPs and could be

carried out without full PPE. New guidance published on 24th April again designated chest compressions as a non-AGP but recommended that healthcare organisations may choose to advise their clinical staff to wear FFP3 respirators, gowns, eye protection, and gloves when performing chest compressions. However, the same guidance also strongly advised that there should not be potential delays in delivering this "life-saving intervention".(6)

The International Liaison Committee on Resuscitation (ILCOR) recently published a systematic review which aimed to identify the risk of potential transmission from chest compression, defibrillation and CPR. (4) Of the 11 studies included in that review, five were case reports (a very weak design) describing a total of 9 healthcare workers who developed a serious respiratory disease after performing CPR on a patient with that disease. Three were simulation studies on mannikins. Of the other three, two were retrospective cohort studies and one was a case-control study. The review rightly concludes, the quality of primary evidence was thus low or very low, and studies provided only indirect evidence with none directly reporting on transmission of SARS-CoV-2. The review recommended that absence of evidence should ***not*** be interpreted as providing evidence that chest compressions are non-aerosol generating.(4)

The PHE recommendation that chest compression is not an AGP is thus not evidence-based. The recommendations in the PHE guidance also conflict with the majority of guidelines and position statements we have reviewed, which classify CPR as an AGP or possible AGP (systematic review in preparation). These include the US Centers for Disease Control and Prevention and the European Society of Intensive Care Medicine and Society of Critical Care Medicine.(7,8) The latest WHO COVID-19 specific guidance classifies CPR as an AGP (1). Resuscitation Council UK has also recommended full PPE including FFP3 mask, full gown with long sleeves, gloves and eye protection as well as shoe protection for chest compressions. (9) They have based their guidance on the WHO and the ILCOR guidance. (1, 4).

The European Resuscitation Council further recommends full PPE prior to starting chest compressions even if this results in a brief delay which may be associated with increased mortality and morbidity(9). They highlighted that the safety of staff is paramount. This comment should be interpreted in the light of a case series of 136 COVID-19 patients who required CPR, of whom only 18 ever had return of spontaneous circulation; 4 survived for at least 30 days and only one patient achieved a favourable neurological outcome at 30 days.(10) This extremely poor prognosis is because most cardiac arrests in COVID-19 are pre-terminal events secondary to respiratory failure or multiorgan failure.(3)

In conclusion, the potential for recovery of the patient needs to be carefully balanced with the significant risk to the health care worker. In view of the intense anxiety of health care workers and in the absence of definitive evidence, we strongly recommend applying the precautionary principle and support the use of full PPE before giving chest compressions during the pandemic.

Acknowledgements

KK is supported by the National Institute for Health Research (NIHR) Applied Research Collaboration East Midlands (ARC EM) and the NIHR Leicester Biomedical Research Centre (BRC). The views expressed are those of the author(s) and not necessarily those of the NIHR, NHS or the Department of Health and Social Care.

References

1. World Health Organisation. Modes of transmission of virus causing COVID-19: implications for IPC precaution recommendations. 27 March 2020 [Available from: https://www.who.int/news-room/commentaries/detail/modes-of-transmission-of-virus-causing-covid-19-implications-for-ipc-precaution-recommendations. Accessed on June 4 2020.
2. Majeed A, Molokhia M, Pankhania B, Asanati K. Protecting the health of doctors during the COVID-19 pandemic. Br J Gen Pract. 2020;70(695):268-9.
3. Fritz Z, Perkins GD. Cardiopulmonary resuscitation after hospital admission with covid-19. BMJ. 2020;369:m1387.
4. 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.
5. Mahase E, Kmietowicz Z. Covid-19: Doctors are told not to perform CPR on patients in cardiac arrest. BMJ. 29 March 2020 368:m1282.
6. Public Health England. COVID-19: infection prevention and control guidance UK [Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/886668/COVID-19_Infection_prevention_and_control_guidance_complete.pdf. Accessed on April 24 2020.
7. Center for Disease Control and Prevention. Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) in Healthcare Settings 2020 [Available from: https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control-recommendations.html. Accessed on June 4 2020.
8. European Resuscitation Council. European Resuscitation Council COVID-19 Guidelines 2020 [Available from: https://www.erc.edu/sites/5714e77d5e615861f00f7d18/content_entry5ea884fa4c84867335e4d1ff/5ea885f34c84867335e4d20e/files/ERC_covid19_pages.pdf?1588257310. Accessed on June 4 2020.
9. Resuscitation Council(UK). Updated RCUK Statement on PHE PPE Guidance: 28 April 2020 [Available from: https://www.resus.org.uk/media/statements/resuscitation-council-uk-statements-on-covid-19-coronavirus-cpr-and-resuscitation/statement-on-phe-ppe-guidance. Accessed on June 4 2020.
10. Shao FS, X. Ma, X. Xu, Z. Lyu, J et al In-hospital cardiac arrest outcomes among patients with COVID-19 pneumonia in Wuhan, China. Resuscitation. 2020;Volume 151:18-23.