Evidence update: COVID-19 and infection risk to rescuer- 14th June 2022

Strategy for evidence update:

This update summarises new evidence identified since the ILCOR Consensus on Science and Treatment Recommendations and associated systematic review were completed in April 2020 (Couper 2020 59; Perkins 2020 145) and the evidence update published in January 2021.

We searched MEDLINE (OVID interface), Embase (OVID interface), Cochrane Central Register of Controlled Trials, and the Database of publications on coronavirus disease (COVID-19) developed by the World Health Organisation on 8th June 2022. Where possible, we limited searches to identify studies published since 26th January 2021 (search date of last update). We used the search strategies developed by an information specialist for the original review. We additionally drew on expert knowledge of the literature and identified studies that had cited the systematic review published by Tran and colleagues (Tran 2020 e35797) and our original published review (Couper 2020 59).

We identified 1949 citations. After de-duplication, a single reviewer screened the title and abstract of 1700 citations. A single reviewer then screened the full-text of 41 studies. We identified seven new studies that were eligible for inclusion.

Evidence by research question

Research question one: Aerosol generation due to chest compressions, defibrillation or CPR

We identified no new studies eligible for inclusion.

Research question two: Transmission of infection due to chest compressions, defibrillation or CPR

We identified one new study eligible for inclusion (Soni 2021 920). In this cross-sectional study, 393 healthcare professionals in an Indian hospital completed a survey which recorded whether they had participated in a resuscitation attempt (197 had participated at least once; 196 had not participated. Subsequently 5 individuals (2.53%) that had participated in a resuscitation contracted COVID-19, compared with 10 (5.10%) who had not participated in a resuscitation attempt.

A risk of bias assessment is included below.

Research question three: PPE strategies and effect on infection with the same organism as the patient, PPE effectiveness, and quality of CPR.

We identified six new studies eligible for inclusion, all of which are manikin studies and are summarised in the table below

Study	Design/ setting	Population	Intervention	Comparator	Key relevant findings
Banfai 2022 82	Non-inferiority manikin RCT (parallel)	216 first year healthcare students (adult CPR)	Surgical mask	Cloth mask	Chest compression quality depth/ rate) not inferior when wearing cloth mask
Barcala-Furelos 2021 163	Manikin controlled trial (crossover)-	7 lifeguard teams (2 lifeguards per team) on	Intervention 1: Control group PPE + apron	Gloves, FFP mask, glasses	Time to CPR shortest in control group. No statistically significant difference in CPR quality across groups.

	not randomised	travelling lifeboat (adult CPR)	1: Control group PPE + waterproof blanket		
Cavallin 2021	Manikin RCT (crossover)	24 neonatal teams (doctor + nurse)	PPE: FFP2 mask, gloves, gown, hat	No PPE	Time to start chest compressions was longer in PPE group
Fernández-Méndez 2021	Manikin RCT (crossover)	20 healthcare professionals (adult CPR)	PPE: KN95 mask, gloves, gown	No PPE	No statistically significant difference in CPR quality between groups
Kienbacher 2021	Non-inferiority manikin RCT (crossover)	24 paramedic teams (adult CPR)	1: FFP2 mask with valve 2) FFP2 mask without valve	No PPE	CPR wearing PPE not inferior to not wearing CPR
Rauch 2021	Manikin RCT (crossover)	34 pre-hospital clinicians	FFP3 mask, safety glasses, gloves, gown	No PPE	No statistically significant difference in CPR quality between groups

A risk of bias assessment is included below.

Summary:

We identified new evidence related to research questions two and three. The findings and quality of these new studies are insufficient to necessitate a review of ILCOR's current treatment recommendations.

References

Bánfai B, Musch J, Betlehem J, et al (2022). How effective are chest compressions when wearing mask? A randomised simulation study among first-year health care students during the COVID-19 pandemic. BMC emergency medicine, 22(1), 82.

Barcala-Furelos R, Abelairas-Gomez C, Alonso-Calvete A, et al (2021). Safe On-Boat Resuscitation by Lifeguards in COVID-19 Era: A Pilot Study Comparing Three Sets of Personal Protective Equipment. Prehospital and disaster medicine, 36(2), 163-169.

Cavallin, F., Lupi, F., Bua, B., Bellutti, M., Staffler, A., & Trevisanuto, D. (2022). Impact of personal protective equipment on neonatal resuscitation procedures: a randomised, cross-over, simulation study. Archives of disease in childhood. Fetal and neonatal edition, 107(2), 211-215. doi:10.1136/archdischild-2021-322216

Couper K, Taylor-Phillips S, Grove A et al (2020). COVID-19 in cardiac arrest and infection risk to rescuers: A systematic review. Resuscitation, 151, 59-66.

Fernández-Méndez M, Otero-Agra M, Fernández-Méndez F, et al (2021). Analysis of Physiological Response during Cardiopulmonary Resuscitation with Personal Protective Equipment: a Randomized Crossover Study. International journal of environmental research and public health, 18(13), 7093.

Kienbacher CL, Grafeneder J, Tscherny K et al. (2021). The use of personal protection equipment does not impair the quality of cardiopulmonary resuscitation: a prospective triple-cross over randomised controlled non-inferiority trial. Resuscitation, 160, 79-83.

Perkins GD, Morley PT, Nolan JP et al (2020). International Liaison Committee on Resuscitation: COVID-19 consensus on science, treatment recommendations and task force insights. Resuscitation, 151, 145-147.

Rauch S, van Veelen MJ, Oberhammer R et al (2021). Effect of Wearing Personal Protective Equipment (PPE) on CPR Quality in Times of the COVID-19 Pandemic-A Simulation, Randomised Crossover Trial. Journal of Clinical Medicine, 10(8), 1728.

Soni L, Maitra S, Ray B et al (2021). Risk of SARS-CoV-2 Infection among Healthcare Providers Involved in Cardiopulmonary Resuscitation in COVID-19 Patients. Indian J Crit Care Med, 25(8), 920-922.

Tran K, Cimon K, Severn M, et al (2012). Aerosol generating procedures and risk of transmission of acute respiratory infections to healthcare workers: a systematic review. PLoS ONE, 7(4), e35797.

Tool for evaluating the methodological quality of cohort studies									
Study	1. Was selection of exposed and non-exposed cohorts drawn from the same population?	2. Can we be confident in the assessment of exposure?	3. Can we be confident that the outcome of interest was not present at start of study?	4. Did the study match exposed and unexposed for all variables that are associated with the outcome of interest or did the statistical analysis adjust for these prognostic variables?	5. Can we be confident in the assessment of the presence or absence of prognostic factors?	6. Can we be confident in the assessment of outcome?	7. Was the follow up of cohorts adequate?	8. Were co-interventions similar between groups?	Comments
Soni 2021	Unsure	Probably yes	Probably yes	Definitely no	Definitely no	Unsure	Probably no	Unsure	Cross-sectional study. Very limited analysis. No consideration of exposure to other risks
Barcala-Furelos 2021	Definitely yes	Definitely yes	Definitely yes	Definitely yes	Definitely yes	Unsure	Probably yes	Definitely no	Scenarios undertaken in fixed order, creating significant concern about learning effects

Cochrane tool for evaluating the methodological quality of randomised controlled trials								
Study	Selection bias Random sequence generation	Selection bias Allocation concealment	Reporting bias Selective reporting	Other bias Other sources of bias	Performance bias Blinding (participants and personnel)	Detection bias Blinding (outcome assessment)	Attrition bias Incomplete outcome data	Comments
Banfai 2022	High	High	Unclear	Unclear	High	Low	Low	Not registered
Cavallin 2021	Low	Unclear	Unclear	Unclear	High	High	Low	Not registered
Fernández-Méndez 2021	Unclear	Unclear	Unclear	High	High	High	Unclear	Not registered
Kienbacher 2021	Unclear	Unclear	Unclear	Unclear	High	Low	Low	Not registered

Rauch 2021	Unclear	Unclear	Unclear	Low	High	Low	Low	Registered- slight discrepancy between outcomes registered and those reported