Evidence update: COVID-19 and infection risk to rescuer- 5th August 2020

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)

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 3rd August 2020. We limited searches to identify studies published since 24th March 2020 (search date of original review). 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).

We identified 643 citations, of which 513 remained following de-duplication. These were screened by a single reviewer at title and abstract stage. Twenty citations were subsequently reviewed for eligibility by a single reviewer. We identified three 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 one new eligible study. Ott et al used simulation and cadaver to evaluate aerosol spread during chest compression delivery.(Ott 2020 192) The study reported aerosol generation during chest compression delivery in simulation and cadaver models of cardiac arrest. The use of a surgical mask over the patient's face or laryngeal mask airway reduced aerosol spread towards the rescuer. The study and accompanying editorial highlighted the limitations of simulation and cadaver models.(Simonds 2020 205)

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

> We identified one new eligible study. Ran et al undertook an observational study in healthcare workers at a Wuhan hospital.(Ran 2020) Exposure to key activities was compared between healthcare workers that were infected with COVID-19 and those not infected. Exposure data were collected in a survey. Of 72 included healthcare workers, 22 were infected with COVID-19. One non-infected individual was exposed to CPR during the study period (reported relative risk of infection 0.63, 95% confidence interval 0.06 to 7.08). 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 one new eligible study. In a manikin randomised controlled trial, 80 hospital-based healthcare professional were randomised to wear either a surgical or N95 mask during CPR delivery for two-minutes.(Tian 2020) Chest compressions were slower (107 ± 16 vs. 118 ± 16, p = 0.004) and shallower (47 ± 9 vs. 52 ± 7, p = 0.020) and shallower in the N95 mask group. Rescuer fatigue after two-minutes CPR delivery was higher in the N95 mask group. A risk of bias assessment is included below.

Summary:

We identified new evidence related to each review question. Overall, the findings of these studies are insufficient to modify ILCOR's current treatment recommendations.

References

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.

Ott M, Milazzo A, Liebau S et al (2020). Exploration of strategies to reduce aerosol-spread during chest compressions: A simulation and cadaver model. Resuscitation, 152, 192-198.

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.

Ran L, Chen X, Wang Y et al (2020). Risk Factors of Healthcare Workers with Corona Virus Disease 2019: A Retrospective Cohort Study in a Designated Hospital of Wuhan in China. Clinical Infectious Diseases. Epub ahead of print 17 March 2020, https://doi.org/10.1093/cid/ciaa287.

Simonds AK (2020). 'Led by the science', evidence gaps, and the risks of aerosol transmission of SARS-COV-2. Resuscitation, 152, 205-207.

Tian Y, Tu X, Zhou X et al (2020). Wearing a N95 mask increases rescuer's fatigue and decreases chest compression quality in simulated cardiopulmonary resuscitation. The American Journal of Emergency Medicine. Epub ahead of print 26 May 2020, https://doi.org/10.1016/j.ajem.2020.05.065.

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
Ran et al 2020	Probably yes	Probably yes	Definitely yes	Definitely no	Probably yes	Probably yes	Probably yes	Definitely no	HCWs were surveyed to collect exposure data. Potential recall bias, particularly in relation to personal protective equipment use. Single non-infected individual- very imprecise estimate of risk. Multiple exposures for each individual.

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
Tian 2020	Unclear	Unclear	Unclear	Low	High	High	Low	Limited reporting of methods.