# Is Cardio Pulmonary Resuscitation an Aerosol Generating Procedure?

# Date search conducted

22 May 2020

# Source(s)

All though [HDAS](http://hdas.nice.org.uk)

Medline

Cinahl

Embase

Emcare

Pubmed

Google / Microsoft Academic Search for additional sources.

# Search strategy

|  |  |
| --- | --- |
| "Compression only CPR" OR "Compression only Cardio pulmonary resuscitation" OR "Compression only Cardiopulmonary resuscitation" OR "Chest compression\*" OR "hand\* only CPR" OR "hand\* only Cardio pulmonary resuscitation" OR "hand\* only Cardiopulmonary resuscitation" OR LUCAS OR "mechanical cpr” or “mechanical cardio pulmonary resuscitation” OR “mechanical cardiopulmonary resuscitation” OR “cardio pulmonary resuscitation” OR “cardiopulmonary resuscitation” OR "Advanced Life Support" OR (ALS).ti OR "Basic Life Support" OR (BLS).ti or \*"CARDIOPULMONARY RESUSCITATION"/ OR \*RESUSCITATION/ |  |
|  | AND |
| Airborne transmission or \*AEROSOL/ OR "Aerosol Generating Procedure\*" OR (AGP\*).ti OR Aerosol\* |  |

All results limited to years 2004-2020. In addition they were hand sorted to eliminate erroneous material.

# Audience/Context

Medical Directors, Ambulance Service Managers and Research Paramedics.

# Additional material

Search Google, Microsoft Academic Search.

Guidelines

Aerosol Generating Procedures (AGPs) NHS National Services Scotland. Health Protection Scotland. <https://hpspubsrepo.blob.core.windows.net/hps-website/nss/2893/documents/1_tbp-lr-agp-v1.pdf>

Guidance COVID-19: guidance for Ambulance Trusts. Public Health England. <https://www.gov.uk/government/publications/covid-19-guidance-for-ambulance-trusts/covid-19-guidance-for-ambulance-trusts>

Guidance: COVID-19: guidance for first responders. Public Health England <https://www.gov.uk/government/publications/novel-coronavirus-2019-ncov-interim-guidance-for-first-responders/interim-guidance-for-first-responders-and-others-in-close-contact-with-symptomatic-people-with-potential-2019-ncov>

Resuscitation Council UK Statements on COVID-19 (Coronavirus), CPR and Resuscitation <https://www.resus.org.uk/media/statements/resuscitation-council-uk-statements-on-covid-19-coronavirus-cpr-and-resuscitation/>

European Resuscitation Council COVID-19 Guidelines <https://www.erc.edu/sites/5714e77d5e615861f00f7d18/content_entry5ea884fa4c84867335e4d1ff/5ea885f34c84867335e4d20e/files/ERC_covid19_pages.pdf>

COVID-19 Practical Guidance for Implementation <https://www.ilcor.org/covid-19>

Additional References

Schumacher J, Gray SA, Michel S, Alcock R and Brinker A. Respiratory protection during simulated emergency pediatric life support: a randomized, controlled, crossover study. Prehospital & Disaster Medicine. 2013;28:33-8. [10.1017/S1049023X12001525](https://doi.org/10.1017/s1049023x12001525)

Shin H, Oh J, Lim TH, Kang H, Song Y and Lee S. Comparing the protective performances of 3 types of N95 filtering facepiece respirators during chest compressions: A randomized simulation study. Medicine. 2017;96:e8308. [10.1097/MD.0000000000008308](https://doi.org/10.1097/md.0000000000008308)

# MEDLINE, CINAHL, EMBASE, EMCARE, PUBMED (HDAS)

Results Saved Results

**26** of **26 saved results**

**1. Resuscitation of the patient with suspected/confirmed COVID-19 when wearing personal protective equipment: A randomized multicenter crossover simulation trial.**

**Author(s):** Malysz, Marek; Dabrowski, Marek; Böttiger, Bernd W; Smereka, Jacek; Kulak, Klaudia; Szarpak, Agnieszka; Jaguszewski, Milosz; Filipiak, Krzysztof J; Ladny, Jerzy R; Ruetzler, Kurt; Szarpak, Lukasz

**Source:** Cardiology journal; May 2020

**Publication Date:** May 2020

**Publication Type(s):** Journal Article

**DOI:** [http://dx.doi.org/10.5603/CJ.a2020.0068](http://doi.org/10.5603/CJ.a2020.0068)

**ISSN:** 1897-5593

**Place of Publication:** Poland

**PubMedID:** 32419128

**Accession Number:** 32419128

Available at [Cardiology Journal](http://search.ebscohost.com/login.aspx?direct=true&scope=site&site=ehost-live&db=mdc&AN=32419128) - from EBSCO (MEDLINE Complete)

**Keywords: Subject Terms:** Index Medicus; Index Medicus

**Abstract:**BACKGROUNDThe aim of the study was to evaluate various methods of chest compressions in patients with suspected/confirmed SARS-CoV-2 infection conducted by medical students wearing full personal protective equipment (PPE) for aerosol generating procedures (AGP).METHODSThis was prospective, randomized, multicenter, single-blinded, crossover simulation trial. Thirty-five medical students after an advanced cardiovascular life support course, which included performing 2-min continuous chest compression scenarios using 3 methods: (A) manual chest compression (CC), (B) compression with CPRMeter, (C) compression with LifeLine ARM device. During resuscitation they are wearing full personal protective equipment for aerosol generating procedures.RESULTSThe median chest compression depth using manual CC, CPRMeter and LifeLine ARM varied and amounted to 40 (38-45) vs. 45 (40-50) vs. 51 (50-52) mm, respectively (p = 0.002). The median chest compression rate was 109 (IQR; 102-131) compressions per minute (CPM) for manual CC, 107 (105-127) CPM for CPRMeter, and 102 (101-102) CPM for LifeLine ARM (p = 0.027). The percentage of correct chest recoil was the highest for LifeLine ARM - 100% (95-100), 80% (60-90) in CPRMeter group, and the lowest for manual CC - 29% (26-48).CONCLUSIONSAccording to the results of this simulation trial, automated chest compression devices (ACCD) should be used for chest compression of patients with suspected/confirmed COVID-19. In the absence of ACCD, it seems reasonable to change the cardiopulmonary resuscitation algorithm (in the context of patients with suspected/confirmed COVID-19) by reducing the duration of the CPR cycle from the current 2-min to 1-min cycles due to a statistically significant reduction in the quality of chest compressions among rescuers wearing PPE AGP.

**Primary Author Affiliation:** Polish Society of Disaster Medicine, Warsaw, Poland.

**Database:** Medline

**2. COVID-19 and cardiopulmonary resuscitation: the recommended N95 mask may not be adequate.**

**Author(s):** Wong, Patrick; Kim Ong, Sharon Gek; Lim, Wan Yen

**Source:** British journal of anaesthesia; May 2020

**Publication Date:** May 2020

**Publication Type(s):** Journal Article

**DOI:** [http://dx.doi.org/10.1016/j.bja.2020.05.008](http://doi.org/10.1016/j.bja.2020.05.008)

**ISSN:** 1471-6771

**Place of Publication:** England

**PubMedID:** 32425209

**Accession Number:** 32425209

**Keywords: Subject Terms:** Index Medicus; Index Medicus

**Primary Author Affiliation:** Division of Anaesthesiology and Perioperative Sciences, Sengkang General Hospital, Singapore General Hospital, Singapore.

**Database:** Medline

**3. Confusion over CPR in patients with covid-19.**

**Author(s):** Cappuccio, Francesco P

**Source:** BMJ (Clinical research ed.); May 2020; vol. 369 ; p. m1805

**Publication Date:** May 2020

**Publication Type(s):** Letter

**DOI:** [http://dx.doi.org/10.1136/bmj.m1805](http://doi.org/10.1136/bmj.m1805)

**ISSN:** 1756-1833

**Place of Publication:** England

**PubMedID:** 32376595

**Accession Number:** 32376595

Available at [BMJ (Clinical research ed.)](https://go.openathens.net/redirector/nhs?url=https%3A%2F%2Fwww.bmj.com%2Flookup%2Fdoi%2F10.1136%2Fbmj.m1805) - from BMJ Journals - NHS

**Keywords: Subject Terms:** Aerosols; Betacoronavirus; Cardiopulmonary Resuscitation -- methods; Cardiopulmonary Resuscitation -- standards; Coronavirus Infections -- transmission; Humans; Infection Control; Infectious Disease Transmission, Patient-to-Professional -- prevention & control; Pandemics; Personal Protective Equipment; Pneumonia, Viral -- transmission; Practice Guidelines as Topic; State Medicine; United Kingdom; Abridged Index Medicus; Index Medicus; Aerosols; Betacoronavirus; Cardiopulmonary Resuscitation -- methods; Cardiopulmonary Resuscitation -- standards; Coronavirus Infections -- transmission; Humans; Infection Control; Infectious Disease Transmission, Patient-to-Professional -- prevention & control; \*Pandemics; \*Personal Protective Equipment; Pneumonia, Viral -- transmission; Practice Guidelines as Topic; State Medicine; United Kingdom; Abridged Index Medicus; Index Medicus

**Primary Author Affiliation:** University of Warwick and University Hospitals Coventry and Warwickshire NHS Trust, Coventry CV4 7AL, UK.

**Database:** Medline

**4. Covid-19: Are chest compressions an aerosol generating procedure or not?**

**Author(s):** Hassan, Zack As

**Source:** BMJ (Clinical research ed.); May 2020; vol. 369 ; p. m1825

**Publication Date:** May 2020

**Publication Type(s):** Letter Comment

**DOI:** [http://dx.doi.org/10.1136/bmj.m1825](http://doi.org/10.1136/bmj.m1825)

**ISSN:** 1756-1833

**Place of Publication:** England

**PubMedID:** 32371437

**Accession Number:** 32371437

Available at [BMJ (Clinical research ed.)](https://go.openathens.net/redirector/nhs?url=https%3A%2F%2Fwww.bmj.com%2Flookup%2Fdoi%2F10.1136%2Fbmj.m1825) - from BMJ Journals - NHS

Available at [BMJ (Clinical research ed.)](https://www.bmj.com/content/bmj/369/bmj.m1825.full.pdf) - from Unpaywall

**Keywords: Subject Terms:** Aerosols; Betacoronavirus; Cardiopulmonary Resuscitation; Coronavirus Infections -- transmission; Defibrillators; Humans; Pandemics; Pneumonia, Viral; Abridged Index Medicus; Index Medicus; \*Aerosols; Betacoronavirus; \*Cardiopulmonary Resuscitation; \*Coronavirus Infections -- transmission; Defibrillators; Humans; Pandemics; Pneumonia, Viral; Abridged Index Medicus; Index Medicus

**Primary Author Affiliation:** Western General Hospital, NHS Lothian, Edinburgh EH4 2XU, UK.

**Database:** Medline

**5. International Liaison Committee on Resuscitation: COVID-19 consensus on science, treatment recommendations and task force insights.**

**Author(s):** Perkins, G D; Morley, P T; Nolan, J P; Soar, J; Berg, K; Olasveengen, T; Wyckoff, M; Greif, R; Singletary, N; Castren, M; de Caen, A; Wang, T; Escalante, R; Merchant, R M; Hazinski, M; Kloeck, D; Heriot, G; Couper, K; Neumar, R

**Source:** Resuscitation; May 2020; vol. 151 ; p. 145-147

**Publication Date:** May 2020

**Publication Type(s):** Journal Article

**DOI:** [http://dx.doi.org/10.1016/j.resuscitation.2020.04.035](http://doi.org/10.1016/j.resuscitation.2020.04.035)

**ISSN:** 1873-1570

**Place of Publication:** Ireland

**PubMedID:** 32371027

**Accession Number:** 32371027

Available at [Resuscitation](https://linkinghub.elsevier.com/retrieve/pii/S0300957220301738?goto=sd) - from ScienceDirect

Available at [Resuscitation](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7194051) - from Unpaywall

**Keywords: Subject Terms:** Index Medicus; Index Medicus

**Abstract:**Consensus on Science and Treatment recommendations aim to balance the benefits of early resuscitation with the potential for harm to care providers during the COVID-19 pandemic. Chest compressions and cardiopulmonary resuscitation have the potential to generate aerosols. During the current COVID-19 pandemic lay rescuers should consider compressions and public-access defibrillation. Lay rescuers who are willing, trained and able to do so, should consider providing rescue breaths to infants and children in addition to chest compressions. Healthcare professionals should use personal protective equipment for aerosol generating procedures during resuscitation and may consider defibrillation before donning personal protective equipment for aerosol generating procedures.

**Primary Author Affiliation:** International Liaison Committee on Resuscitation, Emile Vanderveldelaan 35, 2845 Niel, Belgium. Electronic address: g.d.perkins@warwick.ac.uk.

**Database:** Medline

**6. A COVID-19-betegek korhazon beluli ujraelesztesenek specialis szempontjaiIntrahospital resuscitation of COVID-19 patients**

**Author(s):** Istvan L. (lacipityu@gmail.hu); Csilla M.; Gyorgy K.; Tamas V.; Akos F.; Mariann B.; Marianna J.; Bela F.

**Source:** Orvosi Hetilap; May 2020; vol. 161 (no. 17); p. 710-712

**Publication Date:** May 2020

**Publication Type(s):** Article

**DOI:** [http://dx.doi.org/10.1556/650.2020.31816](http://doi.org/10.1556/650.2020.31816)

**ISSN:** 0030-6002

**Place of Publication:** Hungary

**Publisher:** Akademiai Kiado Rt. (E-mail: info@akkrt.hu)

**Accession Number:** 2005810637

Available at [Orvosi hetilap](https://akjournals.com/downloadpdf/journals/650/161/17/article-p710.pdf) - from Unpaywall

**Keywords: Subject Terms:** adult; aerosol; airway; article; cardiopulmonary arrest; contamination; controlled study; coronavirus disease 2019; coughing; health care personnel; human; moisture; mortality; pandemic; patient care; resuscitation; sneezing; virus virulence; adult; aerosol; airway; article; \*cardiopulmonary arrest; contamination; controlled study; \*coronavirus disease 2019; coughing; health care personnel; human; moisture; mortality; pandemic; patient care; \*resuscitation; sneezing; \*virus virulence

**Abstract:**The coronavirus pandemic is a serious challenge for healthcare workers worldwide. The virus is spread through the air by droplets of moisture when people cough or sneeze and it has a very high virulence. Procedures generating airway aerosols are dangerous for every participant of patient care. Mortality of COVID-19 is above 10%, thus cardiopulmonary resuscitation is an often needed intervention in this patient group. Resuscitation is an aerosol-generating process and thus carries the risk of contamination. The goal of this article is to give a practice-based overview of the specialities of cardiopulmonary resuscitation in coronavirus-infected patients.Copyright © Szerzo(k)

**Primary Author Affiliation:** Debreceni Egyetem, Altalanos Orvostudomanyi Kar, Aneszteziologiai es Intenziv terapias Tanszek es Klinika, Debrecen, Hungary

**Database:** EMBASE

**7. COVID-19 in cardiac arrest and infection risk to rescuers: A systematic review.**

**Author(s):** Couper, Keith; Taylor-Phillips, Sian; Grove, Amy; Freeman, Karoline; Osokogu, Osemeke; Court, Rachel; Mehrabian, Amin; Morley, Peter T; Nolan, Jerry P; Soar, Jasmeet; Perkins, Gavin D

**Source:** Resuscitation; Apr 2020; vol. 151 ; p. 59-66

**Publication Date:** Apr 2020

**Publication Type(s):** Journal Article Review

**DOI:** [http://dx.doi.org/10.1016/j.resuscitation.2020.04.022](http://doi.org/10.1016/j.resuscitation.2020.04.022)

**ISSN:** 1873-1570

**Place of Publication:** Ireland

**PubMedID:** 32325096

**Accession Number:** 32325096

Available at [Resuscitation](https://linkinghub.elsevier.com/retrieve/pii/S0300957220301593?goto=sd) - from ScienceDirect

Available at [Resuscitation](https://doi.org/10.1016/j.resuscitation.2020.04.022) - from Unpaywall

**Keywords: Subject Terms:** Index Medicus; Index Medicus

**Abstract:**BACKGROUNDThere may be a risk of COVID-19 transmission to rescuers delivering treatment for cardiac arrest. The aim of this review was to identify the potential risk of transmission associated with key interventions (chest compressions, defibrillation, cardiopulmonary resuscitation) to inform international treatment recommendations.METHODSWe undertook a systematic review comprising three questions: (1) aerosol generation associated with key interventions; (2) risk of airborne infection transmission associated with key interventions; and (3) the effect of different personal protective equipment strategies. We searched MEDLINE, Embase, Cochrane Central Register of Controlled Trials, and the World Health Organization COVID-19 database on 24th March 2020. Eligibility criteria were developed individually for each question. We assessed risk of bias for individual studies, and used the GRADE process to assess evidence certainty by outcome.RESULTSWe included eleven studies: two cohort studies, one case control study, five case reports, and three manikin randomised controlled trials. We did not find any direct evidence that chest compressions or defibrillation either are or are not associated with aerosol generation or transmission of infection. Data from manikin studies indicates that donning of personal protective equipment delays treatment delivery. Studies provided only indirect evidence, with no study describing patients with COVID-19. Evidence certainty was low or very low for all outcomes.CONCLUSIONIt is uncertain whether chest compressions or defibrillation cause aerosol generation or transmission of COVID-19 to rescuers. There is very limited evidence and a rapid need for further studies. Review registration: PROSPERO CRD42020175594.

**Primary Author Affiliation:** Warwick Medical School, University of Warwick, Coventry, UK; Critical Care, University Hospitals Birmingham NHS Foundation Trust, Birmingham, UK.

**Database:** Medline

**8. Intrahospital resuscitation of COVID-19 patients**

**Author(s):** László, István; Molnár, Csilla; Koszta, György; Végh, Tamás; Fábián, Ákos; Berhés, Mariann; Juhász, Marianna; Fülesdi, Béla

**Source:** Orvosi hetilap; Apr 2020; vol. 161 (no. 17); p. 710-712

**Publication Date:** Apr 2020

**Publication Type(s):** Journal Article Review

**DOI:** [http://dx.doi.org/10.1556/650.2020.31816](http://doi.org/10.1556/650.2020.31816)

**ISSN:** 1788-6120

**Place of Publication:** Hungary

**PubMedID:** 32324367

**Accession Number:** 32324367

Available at [Orvosi hetilap](https://akjournals.com/downloadpdf/journals/650/161/17/article-p710.pdf) - from Unpaywall

**Keywords: Subject Terms:** Betacoronavirus; Coronavirus; Coronavirus Infections -- complications; Coronavirus Infections -- therapy; Humans; Pandemics; Pneumonia, Viral -- complications; Pneumonia, Viral -- therapy; Resuscitation -- methods; Index Medicus; \*Betacoronavirus; \*Coronavirus; Coronavirus Infections -- complications; Coronavirus Infections -- therapy; Humans; \*Pandemics; Pneumonia, Viral -- complications; Pneumonia, Viral -- therapy; \*Resuscitation -- methods; Index Medicus

**Abstract:**The coronavirus pandemic is a serious challenge for healthcare workers worldwide. The virus is spread through the air by droplets of moisture when people cough or sneeze and it has a very high virulence. Procedures generating airway aerosols are dangerous for every participant of patient care. Mortality of COVID-19 is above 10%, thus cardiopulmonary resuscitation is an often needed intervention in this patient group. Resuscitation is an aerosol-generating process and thus carries the risk of contamination. The goal of this article is to give a practice-based overview of the specialities of cardiopulmonary resuscitation in coronavirus-infected patients. Orv Hetil. 2020. 161(17): 710–712.

**Primary Author Affiliation:** Debreceni Egyetem, Debrecen, Nagyerdei krt. 98., 4032.

**Database:** Medline

**9. Optimizing the trauma resuscitation bay during the covid-19 pandemic**

**Author(s):** Livingston D.H. (livingst@rutgers.edu); Bonne S.; Fox A.; Morello C.

**Source:** Trauma Surgery and Acute Care Open; Apr 2020; vol. 5 (no. 1)

**Publication Date:** Apr 2020

**Publication Type(s):** Article

**DOI:** [http://dx.doi.org/10.1136/tsaco-2020-000488](http://doi.org/10.1136/tsaco-2020-000488)

**ISSN:** 2397-5776 (electronic)

**Place of Publication:** United Kingdom

**Publisher:** BMJ Publishing Group (E-mail: subscriptions@bmjgroup.com)

**Accession Number:** 631585667

Available at [Trauma surgery & acute care open](https://tsaco.bmj.com/content/tsaco/5/1/e000488.full.pdf) - from Unpaywall

**Keywords: Subject Terms:** adult; article; body fluid; Coronavirus disease 2019; disaster; glove; human; injury; New Jersey; nonhuman; pandemic; protective equipment; resuscitation; virus; adult; article; \*body fluid; \*Coronavirus disease 2019; \*disaster; glove; human; \*injury; New Jersey; nonhuman; \*pandemic; protective equipment; \*resuscitation; virus

**Abstract:**The covid-19 global pandemic due to the SARS-CoV2 (CoV2) virus has created the need to adapt hospital workspaces and staffing models, and trauma is no exception. While the optimal configuration of a trauma resuscitation area is debatable, the space needs to be large enough to accommodate the trauma team and ancillary staff. It also needs to have ready access to supplies and equipment to quickly and easily control hemorrhage, secure an airway and initiate fluid resuscitation. Lastly, stores of personal protective equipment in the form of fluid resistant gowns, head covering, face shield, and gloves (both sterile and non-sterile) should be readily available but under strict access. As CoV2 carriers increased in our population in New Jersey, we treated each incoming trauma patient as a potentially CoV2-positive case and sought to reconfigure out trauma resuscitation area to minimize exposure of our supplies to aerosolized virus.Copyright © 2020 Author(s).

**Primary Author Affiliation:** (Livingston, Bonne, Fox) Department of Surgery, Rutgers New Jersey Medical School, Newark, NJ 07103, United States

**Database:** EMCARE

**10. [Emergency Medical Services: COVID-19 crisis].**

**Author(s):** Maudet L; Sarasin F; Dami F; Carron PN; Pasquier M

**Source:** Revue medicale suisse; Apr 2020; vol. 16 (no. N° 691-2); p. 810-814

**Publication Date:** Apr 2020

**Publication Type(s):** Journal Article

**ISSN:** 1660-9379

**Place of Publication:** Switzerland

**PubMedID:** 32348041

**Accession Number:** 32348041

**Abstract:**The COVID-19 epidemic required rapid and frequent adaptations from the prehospital emergency medical services (EMS). The exposure of EMS providers is significant, particularly during procedures at risk of aerosolization such as advanced airways management or cardiopulmonary resuscitation. EMS personal need to be equipped with appropriate personal protective equipment and trained in its use. Interhospital transfers from COVID-19 patients are complex and involve mainly intubated patients. The possible shortage of resources may motivate the implementation of dedicated pre-hospital triage and orientation recommendations, which should be consistent with the hospital processes.

**Primary Author Affiliation:** Service des urgences, CHUV, 1011 Lausanne.

**Database:** PubMed

**11. Are loose-fitting powered air-purifying respirators safe during chest compression? A simulation study.**

**Author(s):** Park, Soo Hyun; Hwang, Sung Yeon; Lee, Guntak; Park, Jong Eun; Kim, Taerim; Shin, Tae Gun; Sim, Min Seob; Jo, Ik Joon; Kim, Seonwoo; Yoon, Hee

**Source:** The American journal of emergency medicine; Mar 2020

**Publication Date:** Mar 2020

**Publication Type(s):** Journal Article

**DOI:** [http://dx.doi.org/10.1016/j.ajem.2020.03.054](http://doi.org/10.1016/j.ajem.2020.03.054)

**ISSN:** 1532-8171

**Place of Publication:** United States

**PubMedID:** 32307296

**Accession Number:** 32307296

Available at [The American journal of emergency medicine](http://ovidsp.ovid.com/athens/ovidweb.cgi?T=JS&PAGE=fulltext&MODE=ovid&CSC=Y&NEWS=N&D=ovft&SEARCH=%2210.1016/j.ajem.2020.03.054%22.di) - from Ovid (Journals @ Ovid) - Remote Access

Available at [The American journal of emergency medicine](https://doi.org/10.1016/j.ajem.2020.03.054) - from Unpaywall

**Keywords: Subject Terms:** Index Medicus; Index Medicus

**Abstract:**BACKGROUNDThe application of appropriate personal protective equipment for respiratory protection to health care workers is a cornerstone for providing safe healthcare in emergency departments. We investigated the protective effect and usefulness of loose-fitting powered air-purifying respirators (PAPRs) during chest compression.METHODSThis was a single-center simulation study performed from May 2019 to July 2019 in a tertiary hospital. We measured the concentrations of ambient aerosol and particles inside the loose-fitting PAPR during chest compression, and this ratio was set as the simulated workplace protecting factor (SWPF). According to the National Institute for Occupational Safety and Health regulations, the assigned protection factor (APF) of loose-fitting PAPRs is 25. Thus, the loose-fitting PAPRs were assumed to have a protective effect when the SWPF were ≥ 250 (APF × 10). We measured the SWPF of PAPR in real time during chest compression and also investigated the problems encountered during its use.RESULTSNinety-one participants (median age 29 [interquartile range (IQR): 26-32] years; 74% female) completed the simulation. None of the participants failed with SWPF below 250 during three sessions of chest compression. The median (IQR) values of SWPF at three cycles were 17,063 (10,145-26,373), 15,683 (9477-32,394), and 16,960 (7695-27,279). There was no disconnection of equipment or mechanical failures during chest compression. In addition, most participants (83%) replied that they rarely or never experienced difficulty in verbal communication and felt that the loose-fitting PAPR was comfortable.CONCLUSIONSThe loose-fitting PAPRs provided sufficient respiratory protection without disturbances during chest compression.

**Primary Author Affiliation:** Department of Emergency Medicine, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Republic of Korea.

**Database:** Medline

**12. Aerosol transmission of severe fever with thrombocytopenia syndrome virus during resuscitation.**

**Author(s):** Moon; Lee, Hyeokjin; Jeon, Ji Hoon; Kwon, Yejin; Kim, Hojin; Wang, Eun Byeol; Seo, Choong Won; Sung, Sul A.; Kim, Su-Hyun; Seok, Hyeri; Choi, Won Suk; Choi, WooYoung; Park, Dae Won

**Source:** Infection Control & Hospital Epidemiology; Feb 2019; vol. 40 (no. 2); p. 238-241

**Publication Date:** Feb 2019

**Publication Type(s):** Academic Journal

**DOI:** [http://dx.doi.org/10.1017/ice.2018.330](http://doi.org/10.1017/ice.2018.330)

**ISSN:** 0899823X

**Publisher:** Cambridge University Press

**Accession Number:** 134377515

**Keywords: Subject Terms:** Communicable Diseases Transmission; Aerosols; RNA Viruses; Resuscitation; Human; Infection Control Methods; Cross Infection; Epidemiological Research; Interviews; Diagnosis, Laboratory; Case Studies; \*Communicable Diseases Transmission; \*Aerosols; \*RNA Viruses; \*Resuscitation; Human; Infection Control Methods; Cross Infection; Epidemiological Research; Interviews; Diagnosis, Laboratory; Case Studies

**Abstract:**We investigated potential nosocomial aerosol transmission of severe fever with thrombocytopenia syndrome virus (SFTSV) with droplet precautions. During aerosol generating procedures, SFTSV was be transmitted from person to person through aerosols. Thus, airborne precautions should be added to standard precautions to avoid direct contact and droplet transmission.

**Primary Author Affiliation:** Department of Internal Medicine, Korea University Ansan Hospital, Ansan, Republic of Korea

**Database:** CINAHL

**13. Are quantitative fit factors predictive of respirator fit during simulated healthcare activities?**

**Author(s):** Sietsema M; Brosseau LM

**Source:** Journal of occupational and environmental hygiene; 2018; vol. 15 (no. 12); p. 803-809

**Publication Date:** 2018

**Publication Type(s):** Journal Article; Research Support, Non-U.S. Gov't; Research Support, U.S. Gov't, P.H.S.

**DOI:** [http://dx.doi.org/10.1080/15459624.2018.1515490](http://doi.org/10.1080/15459624.2018.1515490)

**ISSN:** 1545-9632

**Place of Publication:** England

**PubMedID:** 30142034

**Accession Number:** 30142034

Available at [Journal of occupational and environmental hygiene](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6372317) - from Unpaywall

**Keywords: Subject Terms:** Real-time respirator fit; respiratory protection; simulated workplace protection factor; \*Real-time respirator fit; \*respiratory protection; \*simulated workplace protection factor

**Abstract:**An annual OSHA fit test is required for all U.S. employees required to wear a respirator during work, but there are limited data demonstrating a link between fit test results and respirator fit during work. The goal of this research is to determine if the fit factor (FF) achieved during an abbreviated ambient aerosol condensation particle counter (CPC) quantitative fit test is predictive of fit achieved during a simulated workplace protection factor (SWPF) scenario that includes realistic healthcare activities. Fifteen subjects (7 male; 8 female) were recruited for a range of facial sizes. Each subject donned an N95 filtering facepiece respirator and performed a single 29-min routine consisting of initial and final 2.5 min fast fit tests (five 30-sec exercises: normal breathing, head side to side, head up and down, talking, and bending over) and three repetitions of three 6-min simulated healthcare activities (CPR, ultrasound, and making a hospital bed). Two CPC instruments simultaneously collected second-by-second measures of particle concentration inside and outside of the respirator facepiece. FFs or SWPFs were calculated by dividing outside by inside facepiece concentrations. Overall FFs and SWPFs were highly correlated. Each exercise FF was highly correlated with the overall SWPF. Normal breathing, head up and down, and talking were most predictive of overall SWPF. Normal breathing and talking together were predictive of each of the three simulated healthcare activities. For CPR and bed making activities, head movement exercises were also found to be predictive. A quantitative fit test using a small set of exercises is highly predictive of an individual's fit during simulated work activities. Some exercises (e.g., talking and head movements) are predictive of fit during simulated workplace activities. Limitations include only one respirator model, a small subject pool not representative of the full range of face sizes. This article uses an innovative second-by-second assessment method that collects information about in- and outside-facepiece concentrations throughout the test period.

**Primary Author Affiliation:** a School of Public Health , Environmental and Occupational Health Sciences, University of Illinois at Chicago, Chicago, Illinois.

**Database:** PubMed

**14. Distribution of Legionella and bacterial community composition among regionally diverse US cooling towers.**

**Author(s):** Llewellyn, Anna C; Lucas, Claressa E; Roberts, Sarah E; Brown, Ellen W; Nayak, Bina S; Raphael, Brian H; Winchell, Jonas M

**Source:** PloS one; 2017; vol. 12 (no. 12); p. e0189937

**Publication Date:** 2017

**Publication Type(s):** Journal Article

**DOI:** [http://dx.doi.org/10.1371/journal.pone.0189937](http://doi.org/10.1371/journal.pone.0189937)

**ISSN:** 1932-6203

**Place of Publication:** United States

**PubMedID:** 29261791

**Accession Number:** 29261791

Available at [PloS one](http://europepmc.org/search?query=(DOI:10.1371/journal.pone.0189937)) - from Europe PubMed Central - Open Access

Available at [PloS one](https://dx.plos.org/10.1371/journal.pone.0189937) - from Public Library of Science (PLoS)

Available at [PloS one](http://search.ebscohost.com/login.aspx?direct=true&scope=site&site=ehost-live&db=mdc&AN=29261791) - from EBSCO (MEDLINE Complete)

Available at [PloS one](http://gateway.proquest.com/openurl?ctx_ver=Z39.88-2004&res_id=xri:pqm&req_dat=xri:pqil:pq_clntid=48113&rft_val_fmt=ori/fmt:kev:mtx:journal&genre=article&issn=1932-6203&volume=12&issue=12&spage=e0189937) - from ProQuest (Health Research Premium) - NHS Version

Available at [PloS one](https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0189937&type=printable) - from Unpaywall

**Keywords: Subject Terms:** Biodiversity; Climate; DNA, Bacterial -- isolation & purification; Geography; Legionella -- physiology; Microbiota; Phylogeny; Polymerase Chain Reaction; Seasons; United States -- epidemiology; Water Microbiology; Index Medicus; Biodiversity; Climate; DNA, Bacterial -- isolation & purification; Geography; \*Legionella -- physiology; Microbiota; Phylogeny; Polymerase Chain Reaction; Seasons; United States -- epidemiology; \*Water Microbiology; Index Medicus

**Abstract:**Cooling towers (CTs) are a leading source of outbreaks of Legionnaires' disease (LD), a severe form of pneumonia caused by inhalation of aerosols containing Legionella bacteria. Accordingly, proper maintenance of CTs is vital for the prevention of LD. The aim of this study was to determine the distribution of Legionella in a subset of regionally diverse US CTs and characterize the associated microbial communities. Between July and September of 2016, we obtained aliquots from water samples collected for routine Legionella testing from 196 CTs located in eight of the nine continental US climate regions. After screening for Legionella by PCR, positive samples were cultured and the resulting Legionella isolates were further characterized. Overall, 84% (164) were PCR-positive, including samples from every region studied. Of the PCR-positive samples, Legionella spp were isolated from 47% (78), L. pneumophila was isolated from 32% (53), and L. pneumophila serogroup 1 (Lp1) was isolated from 24% (40). Overall, 144 unique Legionella isolates were identified; 53% (76) of these were Legionella pneumophila. Of the 76 L. pneumophila isolates, 51% (39) were Lp1. Legionella were isolated from CTs in seven of the eight US regions examined. 16S rRNA amplicon sequencing was used to compare the bacterial communities of CT waters with and without detectable Legionella as well as the microbiomes of waters from different climate regions. Interestingly, the microbial communities were homogenous across climate regions. When a subset of seven CTs sampled in April and July were compared, there was no association with changes in corresponding CT microbiomes over time in the samples that became culture-positive for Legionella. Legionella species and Lp1 were detected frequently among the samples examined in this first large-scale study of Legionella in US CTs. Our findings highlight that, under the right conditions, there is the potential for CT-related LD outbreaks to occur throughout the US.

**Primary Author Affiliation:** Laboratory Leadership Service, Centers for Disease Control and Prevention, Atlanta, GA, United States of America.

**Database:** Medline

**15. Healthcare worker infected with Middle East Respiratory Syndrome during cardiopulmonary resuscitation in Korea, 2015.**

**Author(s):** Nam, Hae-Sung; Yeon, Mi-Yeon; Park, Jung Wan; Hong, Jee-Young; Son, Ji Woong

**Source:** Epidemiology and health; 2017; vol. 39 ; p. e2017052

**Publication Date:** 2017

**Publication Type(s):** Journal Article

**DOI:** [http://dx.doi.org/10.4178/epih.e2017052](http://doi.org/10.4178/epih.e2017052)

**ISSN:** 2092-7193

**Place of Publication:** Korea (South)

**PubMedID:** 29129042

**Accession Number:** 29129042

Available at [Epidemiology and health](http://europepmc.org/search?query=(DOI:10.4178/epih.e2017052)) - from Europe PubMed Central - Open Access

Available at [Epidemiology and health](http://www.e-epih.org/upload/pdf/epih-39-e2017052.pdf) - from Unpaywall

**Keywords: Subject Terms:** Adult; Aged, 80 and over; Cardiopulmonary Resuscitation -- adverse effects; Cardiopulmonary Resuscitation -- nursing; Coronavirus Infections -- epidemiology; Coronavirus Infections -- transmission; Disease Outbreaks; Female; Humans; Infectious Disease Transmission, Patient-to-Professional; Male; Nurses; Republic of Korea -- epidemiology; Index Medicus; Adult; Aged, 80 and over; \*Cardiopulmonary Resuscitation -- adverse effects; Cardiopulmonary Resuscitation -- nursing; Coronavirus Infections -- epidemiology; \*Coronavirus Infections -- transmission; \*Disease Outbreaks; Female; Humans; \*Infectious Disease Transmission, Patient-to-Professional; Male; \*Nurses; Republic of Korea -- epidemiology; Index Medicus

**Abstract:**OBJECTIVESDuring the outbreak of the Middle East Respiratory Syndrome (MERS) in Korea in 2015, the Korea Centers for Disease Control and Prevention (KCDC) confirmed a case of MERS in a healthcare worker in Daejeon, South Korea. To verify the precise route of infection for the case, we conducted an in-depth epidemiological investigation in cooperation with the KCDC.METHODSWe reviewed the MERS outbreak investigation report of the KCDC, and interviewed the healthcare worker who had recovered from MERS. Using the media interview data, we reaffirmed and supplemented the nature of the exposure.RESULTSThe healthcare worker, a nurse, was infected while performing cardiopulmonary resuscitation (CPR) for a MERS patient in an isolation room. During the CPR which lasted for an hour, a large amount of body fluid was splashed. The nurse was presumed to have touched the mask to adjust its position during the CPR. She suggested that she was contaminated with the MERS patient's body fluids by wiping away the sweat from her face during the CPR.CONCLUSIONSThe possible routes of infection may include the following: respiratory invasion of aerosols contaminated with MERS-coronavirus (MERS-CoV) through a gap between the face and mask; mucosal exposure to sweat contaminated with MERS-CoV; and contamination during doffing of personal protective equipment. The MERS guidelines should reflect this case to decrease the risk of infection during CPR.

**Primary Author Affiliation:** Department of Preventive Medicine and Public Health, Chungnam National University School of Medicine, Daejeon, Korea.

**Database:** Medline

**16. Vital Signs: Deficiencies in Environmental Control Identified in Outbreaks of Legionnaires' Disease - North America, 2000-2014.**

**Author(s):** Garrison LE; Kunz JM; Cooley LA; Moore MR; Lucas C; Schrag S; Sarisky J; Whitney CG

**Source:** MMWR. Morbidity and mortality weekly report; Jun 2016; vol. 65 (no. 22); p. 576-584

**Publication Date:** Jun 2016

**Publication Type(s):** Journal Article

**DOI:** [http://dx.doi.org/10.15585/mmwr.mm6522e1](http://doi.org/10.15585/mmwr.mm6522e1)

**ISSN:** 1545-861X

**Place of Publication:** United States

**PubMedID:** 27281485

**Accession Number:** 27281485

Available at [MMWR. Morbidity and mortality weekly report](http://openurl.ebscohost.com/linksvc/linking.aspx?genre=article&issn=0149-2195&volume=65&issue=22&spage=576&atitle=Vital%20Signs:%20Deficiencies%20in%20Environmental%20Control%20Identified%20in%20Outbreaks%20of%20Legionnaires%20Disease%20-%20North%20America,%202000-2014) - from EBSCO (CINAHL Plus with Full Text)

Available at [MMWR. Morbidity and mortality weekly report](http://search.ebscohost.com/login.aspx?direct=true&scope=site&site=ehost-live&db=mdc&AN=27281485) - from EBSCO (MEDLINE Complete)

Available at [MMWR. Morbidity and mortality weekly report](http://openurl.ebscohost.com/linksvc/linking.aspx?genre=article&issn=0149-2195&volume=65&issue=22&spage=576) - from EBSCO (Biomedical Reference Collection - Comprehensive)

Available at [MMWR. Morbidity and mortality weekly report](http://gateway.proquest.com/openurl?ctx_ver=Z39.88-2004&res_id=xri:pqm&req_dat=xri:pqil:pq_clntid=48113&rft_val_fmt=ori/fmt:kev:mtx:journal&genre=article&issn=0149-2195&volume=65&issue=22&spage=576) - from ProQuest (Health Research Premium) - NHS Version

Available at [MMWR. Morbidity and mortality weekly report](https://www.cdc.gov/mmwr/volumes/65/wr/pdfs/mm6522e1.pdf) - from Unpaywall

**Abstract:**BACKGROUND: The number of reported cases of Legionnaires' disease, a severe pneumonia caused by the bacterium Legionella, is increasing in the United States. During 2000-2014, the rate of reported legionellosis cases increased from 0.42 to 1.62 per 100,000 persons; 4% of reported cases were outbreak-associated. Legionella is transmitted through aerosolization of contaminated water. A new industry standard for prevention of Legionella growth and transmission in water systems in buildings was published in 2015. CDC investigated outbreaks of Legionnaires' disease to identify gaps in building water system maintenance and guide prevention efforts.METHODS: Information from summaries of CDC Legionnaires' disease outbreak investigations during 2000-2014 was systematically abstracted, and water system maintenance deficiencies from land-based investigations were categorized as process failures, human errors, equipment failures, or unmanaged external changes.RESULTS: During 2000-2014, CDC participated in 38 field investigations of Legionnaires' disease. Among 27 land-based outbreaks, the median number of cases was 10 (range = 3-82) and median outbreak case fatality rate was 7% (range = 0%-80%). Sufficient information to evaluate maintenance deficiencies was available for 23 (85%) investigations. Of these, all had at least one deficiency; 11 (48%) had deficiencies in ≥2 categories. Fifteen cases (65%) were linked to process failures, 12 (52%) to human errors, eight (35%) to equipment failures, and eight (35%) to unmanaged external changes.CONCLUSIONS AND IMPLICATIONS FOR PUBLIC HEALTH PRACTICE: Multiple common preventable maintenance deficiencies were identified in association with disease outbreaks, highlighting the importance of comprehensive water management programs for water systems in buildings. Properly implemented programs, as described in the new industry standard, could reduce Legionella growth and transmission, preventing Legionnaires' disease outbreaks and reducing disease.

**Database:** PubMed

**17. Airborne transmission and precautions: facts and myths.**

**Author(s):** Seto, W H

**Source:** The Journal of hospital infection; Apr 2015; vol. 89 (no. 4); p. 225-228

**Publication Date:** Apr 2015

**Publication Type(s):** Journal Article Review Systematic Review

**DOI:** [http://dx.doi.org/10.1016/j.jhin.2014.11.005](http://doi.org/10.1016/j.jhin.2014.11.005)

**ISSN:** 1532-2939

**Place of Publication:** England

**PubMedID:** 25578684

**Accession Number:** 25578684

Available at [The Journal of hospital infection](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7132528) - from Unpaywall

**Keywords: Subject Terms:** Aerosols; Air Microbiology; Disease Transmission, Infectious; Humans; Infection Control -- methods; Intubation, Intratracheal -- adverse effects; Patient Isolation; Respiratory Protective Devices; Respiratory Tract Infections -- transmission; Virus Diseases -- transmission; Index Medicus; \*Aerosols; \*Air Microbiology; \*Disease Transmission, Infectious; Humans; \*Infection Control -- methods; Intubation, Intratracheal -- adverse effects; Patient Isolation; Respiratory Protective Devices; \*Respiratory Tract Infections -- transmission; \*Virus Diseases -- transmission; Index Medicus

**Abstract:**Airborne transmission occurs only when infectious particles of <5 μm, known as aerosols, are propelled into the air. The prevention of such transmission is expensive, requiring N95 respirators and negative pressure isolation rooms. This lecture first discussed whether respiratory viral infections are airborne with reference to published reviews of studies before 2008, comparative trials of surgical masks and N95 respirators, and relevant new experimental studies. However, the most recent experimental study, using naturally infected influenza volunteers as the source, showed negative results from all the manikins that were exposed. Modelling studies by ventilation engineers were then summarized to explain why these results were not unexpected. Second, the systematic review commissioned by the World Health Organization on what constituted aerosol-generating procedures was summarized. From the available evidence, endotracheal intubation either by itself or combined with other procedures (e.g. cardiopulmonary resuscitation or bronchoscopy) was consistently associated with increased risk of transmission by the generation of aerosols.

**Primary Author Affiliation:** University of Hong Kong, School of Public Health, Hong Kong, SAR, China. Electronic address: whseto@ha.org.hk.

**Database:** Medline

**18. Identification of legionella in the environment.**

**Author(s):** Kozak, Natalia A; Lucas, Claressa E; Winchell, Jonas M

**Source:** Methods in molecular biology (Clifton, N.J.); 2013; vol. 954 ; p. 3-25

**Publication Date:** 2013

**Publication Type(s):** Journal Article

**DOI:** [http://dx.doi.org/10.1007/978-1-62703-161-5\_1](http://doi.org/10.1007/978-1-62703-161-5_1)

**ISSN:** 1940-6029

**Place of Publication:** United States

**PubMedID:** 23150387

**Accession Number:** 23150387

**Keywords: Subject Terms:** Biofilms; Environmental Monitoring -- methods; Legionella -- isolation & purification; Legionella -- physiology; Soil Microbiology; Specimen Handling -- methods; Water Microbiology; Index Medicus; Biofilms; \*Environmental Monitoring -- methods; \*Legionella -- isolation & purification; Legionella -- physiology; Soil Microbiology; Specimen Handling -- methods; Water Microbiology; Index Medicus

**Abstract:**Legionella is ubiquitous in freshwater systems worldwide and can also be found in soil. Legionellosis may be caused by inhalation of aerosolized water or soil particles containing Legionella. Isolation of Legionella from the environment is an essential step in outbreak investigation and may also be performed within the context of a hazard analysis and control risk management plan. Culture remains the gold standard for detection of Legionella in environmental samples. Specific properties of environmental sites that could be a source of Legionella contamination, collection of samples from such sites, and procedures for culture of these samples for Legionella are described in this chapter.

**Primary Author Affiliation:** Centers for Disease Control and Prevention, Atlanta, GA, USA. htv2@cdc.gov

**Database:** Medline

**19. Respiratory source control versus receiver protection: impact of facemask fit.**

**Author(s):** Mansour MM; Smaldone GC

**Source:** Journal of aerosol medicine and pulmonary drug delivery; Jun 2013; vol. 26 (no. 3); p. 131-137

**Publication Date:** Jun 2013

**Publication Type(s):** Comparative Study; Journal Article; Research Support, Non-U.S. Gov't

**DOI:** [http://dx.doi.org/10.1089/jamp.2012.0998](http://doi.org/10.1089/jamp.2012.0998)

**ISSN:** 1941-2703

**Place of Publication:** United States

**PubMedID:** 23544951

**Accession Number:** 23544951

Available at [Journal of aerosol medicine and pulmonary drug delivery](http://gateway.proquest.com/openurl?ctx_ver=Z39.88-2004&res_id=xri:pqm&req_dat=xri:pqil:pq_clntid=48113&rft_val_fmt=ori/fmt:kev:mtx:journal&genre=article&issn=1941-2711&volume=26&issue=3&spage=131) - from ProQuest (Health Research Premium) - NHS Version

**Abstract:**BACKGROUND: Placing a surgical mask on an infected patient (respiratory source control) may offer a health-care worker (HCW) more protection than donning an N95 respirator (receiver protection). This observation was made in an in vitro study that used hard, nondeformable faces, and the lack of proper N95 fit may have accounted for the observed results. In the present study, we test the effects of fit on respiratory source control protection, using a soft, deformable mannequin head.METHODS: Resusci Anne CPR mannequin heads were placed in a chamber allowing 6 air exchanges/hr (14 cubic feet per minute), to simulate an infected patient (source) and an HCW (receiver). The heads were ventilated with a tidal breathing pattern. The source exhaled radioactive aerosols, and a filter was attached to the receiver to quantify inhaled exposure. N95 respirators and surgical masks were tested on both heads. The degree of protection was expressed by calculating the reduction in exposure expressed as a simulated workplace protection factor (sWPF; the ratio of exposure with mask to exposure without mask) compared statistically using confidence intervals.RESULTS: Use of the Resusci Anne heads resulted in improved fit, with higher sWPF than previously reported, for example, for source N95 mask combinations (7,174 vs. 317) as well as receiver (7.53 vs. 1.37). Masks placed on the receiver provided minimal exposure protection (sWPF range 0.99-7.53), except when sealed with Vaseline (sWPF 63.1). Any mask applied to the source mannequin resulted in significant reductions in exposure (sWPF range 214-17,038).CONCLUSION: Improved fit significantly enhanced the effects of source control protection. A Vaseline-sealed N95 respirator on the receiver offered less protection when compared with any mask on the source. Respiratory source control can offer more protection to HCW and potentially decrease the spread of aerosolized infections.

**Primary Author Affiliation:** Stony Brook University Medical Center, Pulmonary, Critical Care and Sleep Division, Stony Brook, NY 11794-8172, USA.

**Database:** PubMed

**20. Aerosol generating procedures and risk of transmission of acute respiratory infections to healthcare workers: a systematic review.**

**Author(s):** Tran, Khai; Cimon, Karen; Severn, Melissa; Pessoa-Silva, Carmem L; Conly, John

**Source:** PloS one; 2012; vol. 7 (no. 4); p. e35797

**Publication Date:** 2012

**Publication Type(s):** Research Support, Non-u.s. Gov't Meta-analysis Journal Article Review Systematic Review

**DOI:** [http://dx.doi.org/10.1371/journal.pone.0035797](http://doi.org/10.1371/journal.pone.0035797)

**ISSN:** 1932-6203

**Place of Publication:** United States

**PubMedID:** 22563403

**Accession Number:** 22563403

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Available at [PloS one](https://dx.plos.org/10.1371/journal.pone.0035797) - from Public Library of Science (PLoS)

Available at [PloS one](http://search.ebscohost.com/login.aspx?direct=true&scope=site&site=ehost-live&db=mdc&AN=22563403) - from EBSCO (MEDLINE Complete)

Available at [PloS one](http://gateway.proquest.com/openurl?ctx_ver=Z39.88-2004&res_id=xri:pqm&req_dat=xri:pqil:pq_clntid=48113&rft_val_fmt=ori/fmt:kev:mtx:journal&genre=article&issn=1932-6203&volume=7&issue=4&spage=e35797) - from ProQuest (Health Research Premium) - NHS Version

Available at [PloS one](https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0035797&type=printable) - from Unpaywall

**Keywords: Subject Terms:** Acute Disease; Aerosols; Databases, Factual; Health Personnel; Humans; Infectious Disease Transmission, Patient-to-Professional -- statistics & numerical data; Intubation; Risk Factors; SARS Virus -- isolation & purification; Severe Acute Respiratory Syndrome -- transmission; Severe Acute Respiratory Syndrome -- virology; Index Medicus; Acute Disease; \*Aerosols; Databases, Factual; Health Personnel; Humans; Infectious Disease Transmission, Patient-to-Professional -- statistics & numerical data; Intubation; Risk Factors; SARS Virus -- isolation & purification; \*Severe Acute Respiratory Syndrome -- transmission; Severe Acute Respiratory Syndrome -- virology; Index Medicus

**Abstract:**Aerosol generating procedures (AGPs) may expose health care workers (HCWs) to pathogens causing acute respiratory infections (ARIs), but the risk of transmission of ARIs from AGPs is not fully known. We sought to determine the clinical evidence for the risk of transmission of ARIs to HCWs caring for patients undergoing AGPs compared with the risk of transmission to HCWs caring for patients not undergoing AGPs. We searched PubMed, EMBASE, MEDLINE, CINAHL, the Cochrane Library, University of York CRD databases, EuroScan, LILACS, Indian Medlars, Index Medicus for SE Asia, international health technology agencies and the Internet in all languages for articles from 01/01/1990 to 22/10/2010. Independent reviewers screened abstracts using pre-defined criteria, obtained full-text articles, selected relevant studies, and abstracted data. Disagreements were resolved by consensus. The outcome of interest was risk of ARI transmission. The quality of evidence was rated using the GRADE system. We identified 5 case-control and 5 retrospective cohort studies which evaluated transmission of SARS to HCWs. Procedures reported to present an increased risk of transmission included [n; pooled OR(95%CI)] tracheal intubation [n = 4 cohort; 6.6 (2.3, 18.9), and n = 4 case-control; 6.6 (4.1, 10.6)], non-invasive ventilation [n = 2 cohort; OR 3.1(1.4, 6.8)], tracheotomy [n = 1 case-control; 4.2 (1.5, 11.5)] and manual ventilation before intubation [n = 1 cohort; OR 2.8 (1.3, 6.4)]. Other intubation associated procedures, endotracheal aspiration, suction of body fluids, bronchoscopy, nebulizer treatment, administration of O2, high flow O2, manipulation of O2 mask or BiPAP mask, defibrillation, chest compressions, insertion of nasogastric tube, and collection of sputum were not significant. Our findings suggest that some procedures potentially capable of generating aerosols have been associated with increased risk of SARS transmission to HCWs or were a risk factor for transmission, with the most consistent association across multiple studies identified with tracheal intubation.

**Primary Author Affiliation:** Canadian Agency for Drugs and Technologies in Health (CADTH), Ottawa, Ontario, Canada. khait@cadth.ca

**Database:** Medline

**21. Exhaled air dispersion distance during active resuscitation by manual ventilation**

**Author(s):** Hui D.S.C.; Chow B.; Chu L.; Chan M.T.

**Source:** American Journal of Respiratory and Critical Care Medicine; 2012; vol. 185

**Publication Date:** 2012

**Publication Type(s):** Conference Abstract

**ISSN:** 1073-449X

**Publisher:** American Thoracic Society

**Accession Number:** 71987734

**Keywords: Subject Terms:** dispersion; resuscitation; manual ventilation; American; society; expired air; human; patient; plume; filter; breathing; smoke; exposure; health care personnel; risk; procedures; aerosol; membrane; airflow; resuscitator; infection control; heart massage; ward; exhalation; videorecording; laser; anesthesist; simulator; respiratory arrest; silicone; \*dispersion; \*resuscitation; \*manual ventilation; \*American; \*society; \*expired air; human; patient; plume; filter; breathing; smoke; exposure; health care personnel; risk; procedures; aerosol; membrane; airflow; resuscitator; infection control; heart massage; ward; exhalation; videorecording; laser; anesthesist; simulator; respiratory arrest; silicone

**Abstract:**Background: Resuscitation of patients with respiratory arrest by manual ventilation is frequently performed on the medical wards but the exhaled air dispersion distance during this aerosol generating procedure is unknown. Method(s): We examined the exhaled air dispersion when a human patient simulator(HPS) was manually ventilated by an experienced anesthetist using a Laerdal Silicone Resuscitator in a negative pressure isolation room with 16 air exchanges/hr. The experiment was repeated with the addition of pleated hydrophobic membrane breathing filter. Airflow was marked with intrapulmonary smoke for visualization. The leakage jet plume was revealed by laser light-sheet and images captured by high-definition video. Smoke concentration in the plume was estimated from the light scattered by smoke particles whereas significant exposure was defined as where there was at least 20% of normalized smoke concentration. Result(s): During exhalation when there was no connection to the breathing filter, a plume of expired air was observed coming through the expiration diverter in the sagittal plane. The dispersion distance of the exhaled plume of > 20% normalized concentration was 20 cm and that > 80% normalized concentration was 5 cm along the sagittal plane whereas the dispersion distance of the exhaled plume of > 20% concentration in the transverse plane was 22 cm. With the addition of breathing filter, leakage from the expiration diverter was eliminated but there was a new plume of exhaled air at the interface between the mask and patient's face along the transverse plane. The dispersion distance of this exhaled plume of > 20% concentration has increased to 34 cm. Interpretation(s): Without the viral bacterial filter, our data suggest that the healthcare worker performing cardiac massage above and anterior to the patient would be at high risk of exposure to potentially infected exhaled air whereas with addition of the filter, healthcare worker standing next to the patient should be at risk. While it is obvious that addition of a breathing filter has helped remove exhaled air along the sagittal plane from the patient being ventilated manually by bagging, leakage along the transverse plane could be due to high resistance following addition of the filter leading to sideway leakage and/or insufficient pressure by the operator in providing a good seal at the mask and patient interface. Further study is required to examine if there are technical or human factors involved to improve infection control measures during active resuscitation of potentially infected patients.

**Primary Author Affiliation:** Chinese University of Hong Kong, Shatin, Hong Kong

**Database:** EMBASE

**22. Effectiveness of selected surgical masks in arresting vegetative cells and endospores when worn by simulated contagious patients.**

**Author(s):** Green CF; Davidson CS; Panlilio AL; Jensen PA; Jin Y; Gibbs SG; Scarpino PV

**Source:** Infection control and hospital epidemiology; May 2012; vol. 33 (no. 5); p. 487-494

**Publication Date:** May 2012

**Publication Type(s):** Evaluation Study; Journal Article; Research Support, U.S. Gov't, P.H.S.

**DOI:** [http://dx.doi.org/10.1086/665321](http://doi.org/10.1086/665321)

**ISSN:** 1559-6834

**Place of Publication:** United States

**PubMedID:** 22476275

**Accession Number:** 22476275

**Abstract:**OBJECTIVE: The objective of this study was to quantify the effectiveness of selected surgical masks in arresting vegetative cells and endospores in an experimental model that simulated contagious patients.SETTING: Laboratory.METHODS: Five commercially available surgical masks were tested for their ability to arrest infectious agents. Surgical masks were placed over the nose and mouth of mannequin head forms (Simulaids adult model Brad CPR torso). The mannequins were retrofitted with a nebulizer attached to an automated breathing simulator calibrated to a tidal volume of 500 mL/breath and a breathing rate of 20 breaths/min, for a minute respiratory volume of 10 L/min. Aerosols of endospores or vegetative cells were generated with a modified microbiological research establishment-type 6-jet collision nebulizer, while air samples were taken with all-glass impinger (AGI-30) samplers downstream of the point source. All experiments were conducted in a horizontal bioaerosol chamber.RESULTS: Mean arrestance of bioaerosols by the surgical masks ranged from 48% to 68% when the masks were challenged with endospores and from 66% to 76% when they were challenged with vegetative cells. When the arrestance of endospores was evaluated, statistical differences were observed between some pairs, though not all, of the models evaluated. There were no statistically significant differences in arrestance observed between models of surgical masks challenged with vegetative cells.CONCLUSIONS: The arrestance of airborne vegetative cells and endospores by surgical masks worn by simulated contagious patients supports surgical mask use as one of the recommended cough etiquette interventions to limit the transmission of airborne infectious agents.

**Primary Author Affiliation:** Science, Math, and Engineering Division, University of Cincinnati Clermont College, Batavia, Ohio, USA.

**Database:** PubMed

**23. Aerosol generating procedures (AGP) and risk of transmission of acute respiratory diseases (ARD): A systematic review**

**Author(s):** Tran K.; Cimon K.; Severn M.; Pessoa-Silva C.; Conly J.

**Source:** BMC Proceedings; Jun 2011; vol. 5

**Publication Date:** Jun 2011

**Publication Type(s):** Conference Abstract

**ISSN:** 1753-6561

**Publisher:** BioMed Central Ltd.

**Accession Number:** 70730333

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Available at [BMC Proceedings](https://link.springer.com/10.1186/1753-6561-5-S6-P91) - from SpringerLink - Open Access

Available at [BMC Proceedings](http://europepmc.org/search?query=(DOI:10.1186/1753-6561-5-S6-P91)) - from Europe PubMed Central - Open Access

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Available at [BMC Proceedings](https://bmcproc.biomedcentral.com/track/pdf/10.1186/1753-6561-5-S6-P91) - from Unpaywall

**Keywords: Subject Terms:** systematic review; risk; acute respiratory tract disease; procedures; prevention; infection control; aerosol; Medline; endotracheal intubation; intubation; human; Internet; Embase; Cinahl; Cochrane Library; patient; technology; air conditioning; Asia; health; manual ventilation; body fluid; language; consensus; Indian; cohort analysis; data base; severe acute respiratory syndrome; tracheotomy; aspiration; suction; bronchoscopy; nebulizer; oxygen mask; defibrillation; thorax; compression; tube; sputum; \*systematic review; \*risk; \*acute respiratory tract disease; \*procedures; \*prevention; \*infection control; \*aerosol; Medline; endotracheal intubation; intubation; human; Internet; Embase; Cinahl; Cochrane Library; patient; technology; air conditioning; Asia; health; manual ventilation; body fluid; language; consensus; Indian; cohort analysis; data base; severe acute respiratory syndrome; tracheotomy; aspiration; suction; bronchoscopy; nebulizer; oxygen mask; defibrillation; thorax; compression; tube; sputum

**Abstract:**Introduction/objectives: The risk of transmission of ARDs to HCWs from AGPs is not fully known. We sought to determine the evidence for the risk of transmission of acute ARDs to HCWs caring for patients undergoing and not undergoing AGPs. Method(s): We searched PubMed, Medline, Embase, Cinahl, the Cochrane Library, Univ of York CRD databases, EuroScan, LILACS, Indian Medlars, Index Medicus for SE Asia, health technology agencies and the Internet in all languages for articles from 01/01/1990 - 22/10/2010. Abstracts and full text articles were screened and included using pre-defined criteria. Disagreements were resolved by consensus and a 3rd reviewer. Data were extracted and verified by a 2nd reviewer. The outcome of interest was risk of ARD transmission. The quality of evidence was rated using the GRADE system. Result(s): We identified 5 case-control and 5 retrospective cohort studies which evaluated transmission of SARS to HCWs. Procedures with an increased risk of transmission included [n; pooled OR(95%CI)] tracheal intubation [n=8; 6.2 (3.4, 11.3)], non-invasive ventilation [n=2;OR 3.1(1.4, 6.8)], tracheotomy [n=1; 4.2 (1.5, 11.5)] and manual ventilation before intubation [n=1;OR 2.8(1.3, 6.4)]. Other intubation procedures, ET aspiration, suction of body fluids, bronchoscopy, nebulizer treatment, administration of O2, high flow O2, manipulation of O2 mask or BiPAP mask, defibrillation, chest compressions, insertion of NG tube, and collection of sputum were not significant. Conclusion(s): Our findings suggest that some procedures have been associated with increased risk of SARS transmission to HCWs with the most consistent association across multiple studies identified with tracheal intubation. These findings must be interpreted in the context of the very low quality of the studies.

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**Database:** EMBASE

**24. Method for evaluating the relative efficiency of selected n95 respirators and surgical masks to prevent the inhalation of airborne vegetative cells by Healthcare personnel**

**Author(s):** Davidson C.; Scarpino P.V.; Green C.F.; Panlilio A.L.; Stover B.H.; Jensen P.A.; Roselle G.; Gibbs S.G. (sgibbs@unmc.edu)

**Source:** Indoor and Built Environment; Apr 2011; vol. 20 (no. 2); p. 265-277

**Publication Date:** Apr 2011

**Publication Type(s):** Article

**DOI:** [http://dx.doi.org/10.1177/1420326X10378805](http://doi.org/10.1177/1420326X10378805)

**ISSN:** 1420-326X

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**Keywords: Subject Terms:** aerosol; article; audiovisual equipment; Bacillus anthracis; health care personnel; inhalation; nonhuman; priority journal; protective equipment; simulator; surgical mask; ventilator; automated breathing simulator; bacterium aerosol; respiratory protective equipment; \*aerosol; article; audiovisual equipment; Bacillus anthracis; health care personnel; inhalation; nonhuman; priority journal; protective equipment; simulator; \*surgical mask; \*ventilator; automated breathing simulator; \*bacterium aerosol; respiratory protective equipment

**Abstract:**Aerosol droplet- and airborne-transmitted diseases are an important healthcare concern. The anthrax attacks of 2001, severe acute respiratory syndrome outbreaks in 2003 which resulted in transmission to numerous healthcare personnel (HCP) and concerns about smallpox as a bioterrorist agent have contributed to heightened concern about airborne infectious agents. Respirators and surgical masks can provide respiratory protection against such airborne diseases but their efficacy needs to be assessed. This study describes a method for quantitatively assessing the relative efficiency of respiratory protective equipment (RPE) when challenged with a bioaerosol. Five surgical masks, three N95 respirators and three surgical N95 respirators were evaluated. All are commercially available and used in US healthcare settings. Bacterial aerosols of vegetative Bacillus anthracis strain Sterne 34F2 (a surrogate for pathogenic B. anthracis) were generated with a six-jet Collison nebuliser. To mimic human respiratory breathing, an automated breathing simulator (ABS) calibrated to normal tidal volume and active breathing rate (500mL/breath and 20 breath/min, respectively) was used. Respirators were placed on manikin head-forms designed for use in cardiopulmonary resuscitation training and used in our investigation as surrogates for HCP. The method showed that a Collison nebuliser could generate monodisperse bacterial aerosol to effectively test RPE total inward leakage. Also, the AGI-30 air samplers, combined with the ABS, provided an accurate method of quantifying RPE relative effi-ciency. For the 11 RPE this ranged from 34% to 69% with statistically significant differences between several RPE models. We conclude that neither RPE type nor brand name was an indicator of RPE relative efficiency. © SAGE Publications 2010.

**Primary Author Affiliation:** Department of Civil and Environmental Engineering, University of Cincinnati, Cincinnati, OH, United States

**Database:** EMBASE

**25. Nasopharyngeal cooling during resuscitation: Randomized study**

**Author(s):** Taccone F.; Eichwede F.; Desruelles D.; De Longueville D.; Busch H.J.; Barbut D.

**Source:** Critical Care; 2009; vol. 13

**Publication Date:** 2009

**Publication Type(s):** Conference Abstract

**DOI:** [http://dx.doi.org/10.1186/cc7237](http://doi.org/10.1186/cc7237)

**ISSN:** 1364-8535

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Available at [Critical Care](http://europepmc.org/search?query=(DOI:10.1186/cc7237)) - from Europe PubMed Central - Open Access

Available at [Critical Care](https://ccforum.biomedcentral.com/track/pdf/10.1186/cc7237) - from Unpaywall

**Keywords: Subject Terms:** cooling; resuscitation; emergency medicine; intensive care; patient; survival; electric activity; device; defibrillation; nose cavity; hospital; hospital admission; survival time; model; heart ventricle fibrillation; aerosol; \*cooling; \*resuscitation; \*emergency medicine; \*intensive care; patient; survival; electric activity; device; defibrillation; nose cavity; hospital; hospital admission; survival time; model; heart ventricle fibrillation; aerosol

**Abstract:**Introduction: Nasopharyngeal cooling during cardiopulmonary resuscitation has been shown to ease the resuscitation effort and to improve the resuscitation rate, survival and neurologic outcome in porcine models of both prolonged ventricular fibrillation and pulseless electrical activity arrest. The aim of this study was to determine whether nasopharyngeal cooling initiated during resuscitation improves the resuscitation rate (return of spontaneous circulation (ROSC)), survival and neurologic outcome. Method(s): The study is ongoing. Cooling was performed using a novel device (RhinoChill; BeneChill, Inc., San Diego, CA, USA) that sprays a volatile coolant into the nasal cavity. Patients were randomized to nasopharyngeal cooling during resuscitation or no cooling in the field, followed by cooling for all patients in hospital. All patients with witnessed arrest and a downtime less than 20 minutes deemed eligible for resuscitation were included. Nasopharyngeal cooling was initiated either before or after defibrillation and was continued until systemic cooling could be initiated. Patients who had achieved ROSC were excluded. Resuscitation was continued until ROSC was achieved or for 30 minutes. Result(s): Five patients were randomized to treatment and six were controls. ROSC was achieved in five out of five (100%) treated patients but in only three out of six (50%) controls. All five (100%) treated patients survived to hospital admission as compared with one out of six (16.7%) controls. At 24 hours, three out of five (60%) treated patients were alive as compared with none of the controls. The first treated patient who completed the 1-week evaluation was neurologically intact. Conclusion(s): Nasopharyngeal cooling initiated during resuscitation may improve the ROSC rate and survival to 24 hours. The impact of this treatment on long-term survival and neurologic outcome remains to be determined.

**Primary Author Affiliation:** Erasme Hospital, Brussels, Belgium

**Database:** EMBASE

**26. Possible SARS coronavirus transmission during cardiopulmonary resuscitation.**

**Author(s):** Christian, Michael D; Loutfy, Mona; McDonald, L Clifford; Martinez, Kennth F; Ofner, Mariana; Wong, Tom; Wallington, Tamara; Gold, Wayne L; Mederski, Barbara; Green, Karen; Low, Donald E; SARS Investigation Team

**Source:** Emerging infectious diseases; Feb 2004; vol. 10 (no. 2); p. 287-293

**Publication Date:** Feb 2004

**Publication Type(s):** Case Reports Journal Article

**ISSN:** 1080-6040

**Place of Publication:** United States

**PubMedID:** 15030699

**Accession Number:** 15030699

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Available at [Emerging infectious diseases](http://search.ebscohost.com/login.aspx?direct=true&scope=site&site=ehost-live&db=mdc&AN=15030699) - from EBSCO (MEDLINE Complete)

Available at [Emerging infectious diseases](http://openurl.ebscohost.com/linksvc/linking.aspx?genre=article&issn=1080-6040&volume=10&issue=2&spage=287) - from EBSCO (Biomedical Reference Collection - Comprehensive)

Available at [Emerging infectious diseases](https://wwwnc.cdc.gov/eid/article/10/2/pdfs/03-0700.pdf) - from Unpaywall

**Keywords: Subject Terms:** Aerosols; Aged; Air Microbiology; Cardiopulmonary Resuscitation -- adverse effects; Female; Humans; Infectious Disease Transmission, Patient-to-Professional; Ontario -- epidemiology; Personnel, Hospital; Protective Devices -- standards; Quality Control; Severe Acute Respiratory Syndrome -- epidemiology; Severe Acute Respiratory Syndrome -- prevention & control; Severe Acute Respiratory Syndrome -- transmission; Index Medicus; Aerosols; Aged; Air Microbiology; \*Cardiopulmonary Resuscitation -- adverse effects; Female; Humans; Infectious Disease Transmission, Patient-to-Professional; Ontario -- epidemiology; Personnel, Hospital; Protective Devices -- standards; Quality Control; Severe Acute Respiratory Syndrome -- epidemiology; Severe Acute Respiratory Syndrome -- prevention & control; \*Severe Acute Respiratory Syndrome -- transmission; Index Medicus

**Abstract:**Infection of healthcare workers with the severe acute respiratory syndrome-associated coronavirus (SARS-CoV) is thought to occur primarily by either contact or large respiratory droplet transmission. However, infrequent healthcare worker infections occurred despite the use of contact and droplet precautions, particularly during certain aerosol-generating medical procedures. We investigated a possible cluster of SARS-CoV infections in healthcare workers who used contact and droplet precautions during attempted cardiopulmonary resuscitation of a SARS patient. Unlike previously reported instances of transmission during aerosol-generating procedures, the index case-patient was unresponsive, and the intubation procedure was performed quickly and without difficulty. However, before intubation, the patient was ventilated with a bag-valve-mask that may have contributed to aerosolization of SARS-CoV. On the basis of the results of this investigation and previous reports of SARS transmission during aerosol-generating procedures, a systematic approach to the problem is outlined, including the use of the following: 1) administrative controls, 2) environmental engineering controls, 3) personal protective equipment, and 4) quality control.

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**Database:** Medline

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| --- | --- | --- | --- |
| **#** | **Database** | **Search term** | **Results** |
| 1 | Medline | "Compression only CPR" OR "Compression only Cardio pulmonary resuscitation" OR "Compression only Cardiopulmonary resuscitation" OR "Chest compression\*" OR "hand\* only CPR" OR "hand\* only Cardio pulmonary resuscitation" OR "hand\* only Cardiopulmonary resuscitation" OR LUCAS OR "mechanical cpr" OR "mechanical cardio pulmonary resuscitation" OR "mechanical cardiopulmonary resuscitation" OR "cardio pulmonary resuscitation" OR "cardiopulmonary resuscitation" OR "Advanced Life Support" OR (ALS).ti OR "Basic Life Support" OR (BLS).ti OR \*"CARDIOPULMONARY RESUSCITATION"/ OR \*RESUSCITATION/ | 110569 |
| 2 | Medline | "Airborne transmission" OR \*AEROSOL/ OR "Aerosol Generating Procedure\*" OR (AGP\*).ti OR Aerosol\* | 58702 |
| 3 | Medline | (1 AND 2) | 166 |
| 5 | CINAHL | "Compression only CPR" OR "Compression only Cardio pulmonary resuscitation" OR "Compression only Cardiopulmonary resuscitation" OR "Chest compression\*" OR "hand\* only CPR" OR "hand\* only Cardio pulmonary resuscitation" OR "hand\* only Cardiopulmonary resuscitation" OR LUCAS OR "mechanical cpr" OR "mechanical cardio pulmonary resuscitation" OR "mechanical cardiopulmonary resuscitation" OR "cardio pulmonary resuscitation" OR "cardiopulmonary resuscitation" OR "Advanced Life Support" OR (ALS).ti OR "Basic Life Support" OR (BLS).ti OR \*"CARDIOPULMONARY RESUSCITATION"/ OR \*RESUSCITATION/ | 17338 |
| 6 | CINAHL | "Airborne transmission" OR \*AEROSOL/ OR "Aerosol Generating Procedure\*" OR (AGP\*).ti OR Aerosol\* | 5435 |
| 7 | CINAHL | (5 AND 6) | 7 |
| 8 | EMBASE | "Compression only CPR" OR "Compression only Cardio pulmonary resuscitation" OR "Compression only Cardiopulmonary resuscitation" OR "Chest compression\*" OR "hand\* only CPR" OR "hand\* only Cardio pulmonary resuscitation" OR "hand\* only Cardiopulmonary resuscitation" OR LUCAS OR "mechanical cpr" OR "mechanical cardio pulmonary resuscitation" OR "mechanical cardiopulmonary resuscitation" OR "cardio pulmonary resuscitation" OR "cardiopulmonary resuscitation" OR "Advanced Life Support" OR (ALS).ti OR "Basic Life Support" OR (BLS).ti OR \*"CARDIOPULMONARY RESUSCITATION"/ OR \*RESUSCITATION/ | 79474 |
| 9 | EMBASE | "Airborne transmission" OR \*AEROSOL/ OR "Aerosol Generating Procedure\*" OR (AGP\*).ti OR Aerosol\* | 80226 |
| 10 | EMBASE | (8 AND 9) | 70 |
| 11 | EMBASE | \*AEROSOL/ | 21926 |
| 12 | EMCARE | "Compression only CPR" OR "Compression only Cardio pulmonary resuscitation" OR "Compression only Cardiopulmonary resuscitation" OR "Chest compression\*" OR "hand\* only CPR" OR "hand\* only Cardio pulmonary resuscitation" OR "hand\* only Cardiopulmonary resuscitation" OR LUCAS OR "mechanical cpr" OR "mechanical cardio pulmonary resuscitation" OR "mechanical cardiopulmonary resuscitation" OR "cardio pulmonary resuscitation" OR "cardiopulmonary resuscitation" OR "Advanced Life Support" OR (ALS).ti OR "Basic Life Support" OR (BLS).ti OR \*"CARDIOPULMONARY RESUSCITATION"/ OR \*RESUSCITATION/ | 22348 |
| 13 | EMCARE | "Airborne transmission" OR \*AEROSOL/ OR "Aerosol Generating Procedure\*" OR (AGP\*).ti OR Aerosol\* | 10272 |
| 14 | EMCARE | (12 AND 13) | 20 |
| 15 | PubMed | (cpr OR "Compression only CPR" OR "Compression only Cardio pulmonary resuscitation" OR "Compression only Cardiopulmonary resuscitation" OR "Chest compression\*" OR "hand\* only CPR" OR "hand\* only Cardio pulmonary resuscitation" OR "hand\* only Cardiopulmonary resuscitation" OR LUCAS OR "mechanical cpr" OR "mechanical cardio pulmonary resuscitation" OR "mechanical cardiopulmonary resuscitation" OR "cardio pulmonary resuscitation" OR "cardiopulmonary resuscitation").ti,ab | 52976 |
| 16 | PubMed | "Airborne transmission" OR \*AEROSOL/ OR "Aerosol Generating Procedure\*" OR (AGP\*).ti OR Aerosol\* | 57254 |
| 17 | PubMed | (15 AND 16) | 73 |
| 18 | Medline | 3 [DT 2004-2020] | 88 |
| 19 | CINAHL | 7 [DT 2004-2020] | 6 |
| 20 | EMBASE | 10 [DT 2004-2020] | 51 |
| 21 | EMCARE | 14 [Year Published Last 15 Years] | 15 |