Long-distance airborne transmission of SARS-CoV-2: a rapid systematic review

Daphne Duval, Jennifer C Palmer, Isobel Tudge, Nicola Pearce-Smith, Emer O'Connell, Allan Bennett, Rachel Clark

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Section 1. Search strategy

Search strategy Ovid Medline

1 exp SARS-CoV-2/

2 exp COVID-19/

3 (corona* adj1 (virus* or viral*)).tw,kw,kf.

4 (CoV not (Coefficien* or "co-efficien*" or covalent* or Covington* or covariant* or covarianc* or "cut-off value*" or "cutoff value*" or "cut-off volume*" or "cutoff volume*" or "combined optimi?ation value*" or "central vessel trunk*" or CoVR or CoVS)).tw,kw,kf.

5 (coronavirus* or 2019nCoV* or 19nCoV* or "2019 novel*" or Ncov* or "n-cov" or "SARS-CoV-2*" or "SARSCoV-2*" or SARSCoV2* or "SARS-CoV2*" or "severe acute respiratory syndrome*" or COVID*2).tw,kw,kf.

6 exp COVID-19 Vaccines/

7 exp COVID-19 Testing/

8 or/1-7

9 (aerosol or aerosols or aerosolized or aerosolised or airborne).ti.

10 (airborne or aerosol or aerosols or aerosolized or aerosolised or air flow* or airflow* or aerodynamic* or air condition* or droplet* or cough* or sneez* or breath* or sing or singing or shout* or (air adj2 circulat*) or (air adj2 recirculation) or (air adj2 re-circulation) or ((viral or virus) adj2 particle*)).tw,kf.

11 (transmission* or transmit* or distanc* or dispers*).tw,kf.

12 10 and 11

13 ((ventilation or ventilated) and (transmission* or distanc* or dispers*)).tw,kf.

14 ((route or routes or mode or modes) adj2 (transmission* or transmit*)).tw,kf.

15 (far field and (exposure* or transmission* or transmit*)).tw,kf.

16 (long* distance* adj2 (transmission* or transmit*)).tw,kf.

17 Disease Transmission, Infectious/

18 10 and 17

19 Ventilation/

20 Air Conditioning/

21 9 or 12 or 13 or 14 or 15 or 16 or 18 or 19 or 20

22 8 and 21

23 limit 22 to dt=20200727-20220118

24 23 not (exp animals/ not humans.sh.)

25 limit 24 to english language

Ovid Embase

1 (aerosol or aerosols or aerosolized or aerosolised or airborne).ti.

2 (airborne or aerosol or aerosols or aerosolized or aerosolised or air flow* or aerodynamic* or air condition* or droplet* or cough* or sneez* or breath* or sing or singing or shout* or (air adj2 circulat*) or (air adj2 recirculation) or (air adj2 re-circulation) or ((viral or virus) adj2 particle*)).tw,kf.

3 (transmission* or transmit* or distanc* or dispers*).tw,kf.

4 2 and 3

5 ((ventilation or ventilated) and (transmission* or distanc* or dispers*)).tw,kf.

6 ((route or routes or mode or modes) adj2 (transmission* or transmit*)).tw,kf.

7 (far field and (exposure* or transmission* or transmit*)).tw,kf.

8 (long* distance* adj2 (transmission* or transmit*)).tw,kf.

9 disease transmission/ or virus transmission/

10 2 and 9

11 room ventilation/

12 air conditioning/

13 exp airborne transmission/

14 1 or 4 or 5 or 6 or 7 or 8 or 10 or 11 or 12 or 13

15 exp severe acute respiratory syndrome coronavirus 2/ or coronavirus disease 2019/ or experimental coronavirus disease 2019/

16 (corona* adj1 (virus* or viral*)).ti,ab,kf.

17 (CoV not (Coefficien* or co-efficien* or covalent* or covington or covariant* or covarianc* or "cut-off value*" or "cutoff value*" or "cut-off volume*" or "cutoff volume*" or "combined optimi?ation value*" or "central vessel trunk" or CoVR or CoVS)).ti,ab,kf.

18 (coronavirus* or 2019nCoV* or 19nCoV* or "2019 novel*" or Ncov* or "n-cov" or "SARSCoV-2*" or "SARSCoV-2*" or SARSCoV2* or "SARS-CoV2*" or "severe acute respiratory syndrome*" or COVID*2).ti,ab,kf.

19 or/15-18

20 14 and 19

21 limit 20 to dc=20200727-20220118

22 21 not ((exp animal/ or nonhuman/) not exp human/)

23 limit 22 to english language

medRxiv and Arxiv (via NLM Covid portfolio)

aerosol OR aerosols OR aerosoliz* OR aerosolis* OR airborne OR "air flow*" OR airflow* OR "long* distance*" OR "far field" OR "far-field"

WHO COVID database

(aerosol or aerosols or aerosoliz* or aerosolis* or airborne or "air flow*" or airflow* or "long* distance*" or "far field" or "far-field") AND (transmission or transmit* or distanc* or dispers*)

Section 2. Quality criteria checklist

The methodological quality of the included studies was assessed using the quality criteria checklist (QCC) for primary research, which is composed of 10 questions based on quality criteria and domains identified by the Agency for Healthcare Research and Quality (AHRQ)[1]. The QCC tool can be applied to most study designs and is therefore suitable for reviews that include different study designs. The original checklist includes sub-questions to specify how each question should be applied to a specific study design, including descriptive studies (available here: www.andeal.org/evidence-analysis-manual). Each question can be responded with 'yes, 'no', 'unclear' or 'N/A' (not applicable).

We used the sub-questions for descriptive studies to assess the methodological quality of outbreak investigations, although further adjustments had to be made. For instance, for question 2, which assesses selection bias, the sub-question "Were inclusion /exclusion criteria specified?" is not relevant to outbreak investigations and we instead assessed risk of selection bias by considering whether all participants at risk of being exposed at the transmission event(s) had been considered in the investigation. The questions of the QCC tool are presented below, together with the sub-questions we used for outbreak investigations.

For the overall rating, the original QCC tool used 'positive', 'neutral' and 'negative', which we amended to 'high', 'medium' and 'low'. A study was rated as high methodological quality if the answers to the four critical questions (2, 3, 6 and 7) were 'yes' plus at least one of the remaining questions; low if ≥50% of the critical questions answered 'no'; otherwise medium methodological quality.

QCC tool for outbreak investigations

1. Was the research question clearly stated?

2. Was the selection of study subjects/patients free from bias?
Were all participants at risk of being exposed at the transmission event(s) considered in the investigation?

3. Were study groups comparable?
Descriptive outbreak investigation: N/A
Outbreak investigation with an analytic component (comparison between exposed and non-exposed groups): were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis

4. **Was method of handling withdrawals described?**
Where applicable, was response rate specified?

5. Was blinding used to prevent introduction of bias?
N/A

6. Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described?
Was the investigation thorough enough to be able to assess the likelihood of close contact and fomite transmission?

7. Were outcomes clearly defined and the measurements valid and reliable?
Were symptomatic and asymptomatic cases considered?
Was viral genomic sequencing performed?

8. Was the statistical analysis appropriate for the study design and type of outcome indicators?
Descriptive outbreak investigations: N/A

[1] West S, King V, Carey TS, et al. Systems to rate the strength of scientific evidence. US; 2002 April 2002. Report No.: 02-E016 Contract No.: 47.

Outbreak investigation with an analytical component: were statistical analyses adequately described and the results reported appropriately? Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g. multivariate analyses)?

9. Are conclusions supported by results with biases and limitations taken into consideration?

Is there a discussion of findings?

Are biases and study limitations identified and discussed?

10. Is bias due to study's funding or sponsorship unlikely?

Were sources of funding and investigators' affiliations described?

Was there no apparent conflict of interest?

Section 3. List of excluded studies

Retrieval method	Reference	Reason for exclusion
Citation screening	Bae, S. et al. Epidemiological Characteristics of COVID-19 Outbreak at Fitness Centers in Cheonan, Korea	Cannot ascertain exposure
	Benenson, S. et al. High attack rate of COVID-19 in an organized tour group of vaccinated travellers to Iceland	Wrong exposure
	Brlek, A. et al. Possible indirect transmission of COVID-19 at a squash court, Slovenia, March 2020: case report	Cannot ascertain exposure
	Capon, A. et al. Risk factors leading to COVID-19 cases in a Sydney restaurant	Cannot ascertain exposure
	Chiew, C. et al. Investigation of three clusters of COVID-19 in Singapore: implications for surveillance and response measures	Wrong exposure
	Danis, K. et al. Cluster of Coronavirus Disease 2019 (COVID-19) in the French Alps, February 2020	Wrong exposure
	Furuse, Y. et al. Clusters of Coronavirus Disease in Communities, Japan, January-April 2020	Wrong study design
	Hatfield, K. et al. Asymptomatic and Presymptomatic SARS-CoV-2 Infections in Residents of a Long-Term Care Skilled Nursing Facility - King County, Washington, March 2020	Wrong exposure
	Hedges, S. et al. High COVID-19 Attack Rate Among Attendees at Events at a Church - Arkansas, March 2020	Wrong exposure
	Herstein, J. et al. Characteristics of SARS-CoV-2 Transmission among Meat Processing Workers in Nebraska, USA, and Effectiveness of Risk Mitigation Measures	Wrong exposure
	Kain, D. et al. A Longitudinal, Clinical, and Spatial Epidemiologic Analysis of a Large COVID-19 Long-Term Care Home Outbreak	Wrong exposure
	Karumanagoundar, K. et al. Secondary attack rate of COVID-19 among contacts and risk factors, Tamil Nadu, March-May 2020: a retrospective cohort study	Wrong study design
	Kennedy, E. et al. COVID-19 Outbreak Among Employees at a Meat Processing Facility - South Dakota, March-April 2020	Wrong exposure
	Khanh, N. et al. Transmission of SARS-CoV 2 During Long-Haul Flight	Cannot ascertain exposure
	Lendacki, F. et al. COVID-19 Outbreak Among Attendees of an Exercise Facility - Chicago, Illinois, August-September 2020	Wrong exposure
	Mallet, Y. et al. Identification of Workers at Increased Risk of Infection During a COVID-19 Outbreak in a Meat Processing Plant, France, May 2020	Wrong exposure
	Park, S. et al. Coronavirus Disease Outbreak in Call Center, South Korea	Cannot ascertain exposure
	Ritger, K. et al. Community Transmission of SARS-CoV-2 at Two Family Gatherings - Chicago, Illinois, February-March 2020	Wrong exposure
	Shen et al. Community Outbreak Investigation of SARS-CoV-2 Transmission Among Bus Riders in Eastern ChinaMore Detailed Studies Are Needed Reply	Wrong publication type
	Speers, D. et al. Flight-Associated Transmission of Severe Acute Respiratory Syndrome Coronavirus 2 Corroborated by Whole-Genome Sequencing	Cannot ascertain exposure
	Stein-Zamir, C. et al. A large COVID-19 outbreak in a high school 10 days after schools' reopening, Israel, May 2020	Cannot ascertain exposure

Retrieval method	Reference	Reason for exclusion
	Swadi, T. Genomic Evidence of In-Flight Transmission of SARS-CoV-2 Despite Predeparture Testing	Wrong exposure
	Szablewski, C. et al. SARS-CoV-2 Transmission Dynamics in a Sleep-Away Camp	Wrong exposure
	Tambyah, P. et al. Community Outbreak Investigation of SARS-CoV-2 Transmission Among Bus Riders in Eastern China More Detailed Studies Are Needed	Wrong publication type
	Toyokawa, T. et al. Transmission of SARS-CoV-2 during a 2-h domestic flight to Okinawa, Japan, March 2020	Cannot ascertain exposure
	Waltenburg, M. et al. Update: COVID-19 Among Workers in Meat and Poultry Processing Facilities - United States, April-May 2020	Wrong study design
	Weissberg, D. et al. Does respiratory co-infection facilitate dispersal of SARS-CoV-2? investigation of a super-spreading event in an open-space office	Wrong exposure
Literature search	Aizawa, Y. et al. Coronavirus Disease 2019 Cluster Originating in a Primary School Teachers' Room in Japan	Cannot ascertain exposure
	Akaishi, T. et al. COVID-19 Transmission at Schools in Japan	Wrong exposure
	Azimi, P. et al, Mechanistic transmission modeling of COVID-19 on the Diamond Princess cruise ship demonstrates the importance of aerosol transmission	Wrong study design
	Baumgarte, S. et al. Investigation of a Limited but Explosive COVID-19 Outbreak in a German Secondary School	Cannot ascertain exposure
	Bielecki, M. et al, Social Distancing Alters the Clinical Course of COVID-19 in Young Adults: A Comparative Cohort Study	Wrong outcome
	Bohmer, M. M. et al, Investigation of a COVID-19 outbreak in Germany resulting from a single travel-associated primary case: a case series	Wrong exposure
	Boogaard, L. H. et al. A mixed-methods approach to elucidate SARS-CoV-2 transmission routes and clustering in outbreaks in native workers and labour migrants in the fruit and vegetable packaging industry in South Holland, the Netherlands, May to July 2020	Wrong exposure
	Chau, N. V. V. et al, Superspreading Event of SARS-CoV-2 Infection at a Bar, Ho Chi Minh City, Vietnam	Wrong exposure
	Chen, L. et al. Estimation of the SARS-CoV-2 transmission probability in confined traffic space and evaluation of the mitigation strategies	Wrong study design
	Chen, T. et al. Epidemic characteristics of the COVID-19 outbreak in Tianjin, a well-developed city in China	Wrong study design
	Chen, X. et al, Clinical features and short-term outcomes of patients with COVID-19 due to different exposure history	Wrong exposure
	Cheng, P. et al. Predominant airborne transmission and insignificant fomite transmission of SARS-CoV-2 in a two-bus COVID-19 outbreak originating from the same pre-symptomatic index case	Wrong study design
	Choe, Y. J. et al. SARS-CoV-2 transmission in schools in Korea: nationwide cohort study	Wrong study design
	Chu, D. K. W. et al. SARS-CoV-2 Superspread in Fitness Center, Hong Kong, China, March 2021	Wrong exposure

Retrieval method	Reference	Reason for exclusion
	Cuschieri, S. et al. Mass Events Trigger Malta's Second Peak After Initial Successful Pandemic Suppression	Wrong study design
	De Man, P. et al. Outbreak of Coronavirus Disease 2019 (COVID-19) in a Nursing Home Associated with Aerosol Transmission as a Result of Inadequate Ventilation	Wrong exposure
	Delaugerre, C. et al. Prevention of SARS-CoV-2 transmission during a large, live, indoor gathering (SPRING): a non-inferiority, randomised, controlled trial	Wrong study design
	Denpetkul, T. et al. Effects of face masks and ventilation on the risk of SARS-CoV-2 respiratory transmission in public toilets: a quantitative microbial risk assessment	Wrong study design
	Deresinski, S., Possible Aerosol Spread of SARS-CoV-2 in an Apartment Building	Wrong publication type
	Driessche, K.V. et al, Exposure to cough aerosols and development of pulmonary COVID-19	Wrong exposure
	Ehrhardt, J. et al, Transmission of SARS-CoV-2 in children aged 0 to 19 years in childcare facilities and schools after their reopening in May 2020, Baden-Wurttemberg, Germany	Wrong study design
	Evangelista, H. et al, Combining science and social engagement against Covid-19 in a Brazilian Slum	Wrong outcome
	Goldenfeld, M. et al. First Reported Nosocomial SARS-CoV-2 Outbreak in a Hospital-Based Laundry Facility	Wrong exposure
	Gupta, A. et al. A comparative analysis of control measures on-board ship against COVID-19 and similar novel viral respiratory disease outbreak: Quarantine ship or disembark suspects?	Wrong study design
	He, F. et al, Comparative Analysis of 95 Patients with Different Severity in the Early Outbreak of COVID-19 in Wuhan, China	Wrong study design
	Hijnen, D. et al. SARS-CoV-2 transmission from presymptomatic meeting attendee, Germany	Wrong exposure
	Ho, C., Modelling Airborne Transmission and Ventilation Impacts of a COVID-19 Outbreak in a Restaurant in Guangzhou, China	Wrong study design
	Hu, M. et al. Transmission risk of SARS-CoV-2 on airplanes and high-speed trains	Wrong exposure
	Kang, Y. et al, A retrospective view of pediatric cases infected with SARS-CoV-2 of a middle-sized city in mainland China	Wrong study design
	Kim, C. et al. COVID-19 Outbreak in a Military Unit in Korea	Wrong exposure
	Kim, J. G. et al, Air evacuation of passengers with potential SARS-CoV-2 infection under the guidelines for appropriate infection control and prevention	Wrong outcome
	Kolinski, J. M, et al, Superspreading events suggest aerosol transmission of SARS-CoV-2 by accumulation in enclosed spaces	Wrong study design
	Kristiansen, M. F. et al, Epidemiology and clinical course of first wave coronavirus disease cases, faroe islands	Wrong exposure
	Kwon, K. S. et al, Erratum: Correction of Text in the Article "Evidence of Long-Distance Droplet Transmission of SARS-CoV-2 by Direct Air Flow in a Restaurant in Korea"	Wrong publication type
	Lam-Hine, T. et al. Outbreak Associated with SARS-CoV-2 B.1.617.2 (Delta) Variant in an Elementary School - Marin County, California, May-June 2021	Wrong exposure

Retrieval method	Reference	Reason for exclusion
	Lee, B. U. A high attack rate of 90% of SARS-CoV-2 Delta variant infections in crew personnel on a single navy ship	Wrong outcome
	Lee, H., Ahn, K. H. Estimate of the critical exposure time based on 70 confirmed COVID-19 cases	Wrong study design
	Lim, C. et al. Characteristics of Transmission Routes of COVID-19 Cluster Infections in Gangwon Province, Korea	Wrong study design
	Liu, S. et al. A COVID-19 Outbreak - Nangong City, Hebei Province, China, January 2021	Wrong setting
	Lotta-Maria, A. H. et al, Healthcare workers high COVID-19 infection rate: the source of infections and potential for respirators and surgical masks to reduce occupational infections	Wrong setting
	Montecucco, A. et al. Investigating SARS-CoV-2 transmission among co-workers in a University of Northern Italy during COVID-19 pandemic: an observational study	Wrong exposure
	Nsekuye, O. et al. Investigation of Four Clusters of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) in Rwanda, 2020	Wrong exposure
	O'Donnell, M. T. et al. Mitigating SARS-CoV-2 in the Deployed Environment	Wrong exposure
	Pedro, N. et al. Field and Molecular Epidemiology: How Viral Sequencing Changed Transmission Inferences in the First Portuguese SARS-CoV-2 Infection Cluster	Wrong exposure
	Pokora, R. et al, Investigation of superspreading COVID-19 outbreaks events in meat and poultry processing plants in Germany: A cross-sectional study	Wrong exposure
	Pringle, J. C. et al. COVID-19 in a Correctional Facility Employee Following Multiple Brief Exposures to Persons with COVID-19 - Vermont, July-August 2020	Wrong exposure
	Ramirez, D. et al. COVID-19 Transmission during Transportation of 1st to 12th Grade Students: Experience of an Independent School in Virginia	Wrong outcome
	Rankin, D. A. et al, Outbreak of COVID-19 among school auction attendees: Was it a "silent auction" or "silent transmission"?	Cannot ascertain exposure
	Redditt, V. et al, Outbreak of SARS-CoV-2 infection at a large refugee shelter in Toronto, April 2020: a clinical and epidemiologic descriptive analysis	Wrong exposure
	Safer, M. et al. Identification of transmission chains and clusters associated with COVID-19 in Tunisia	Wrong study design
	Sami S. et al, Community Transmission of SARS-CoV-2 Associated with a Local Bar Opening Event - Illinois, February 2021	Cannot ascertain exposure
	Smith, C. R. et al. COVID-19 in a remote First Nations community in British Columbia, Canada: an outbreak report	Wrong exposure
	Sugano, N. et al, Cluster of Severe Acute Respiratory Syndrome Coronavirus 2 Infections Linked to Music Clubs in Osaka, Japan	Wrong exposure
	Sundar, V. et al. Low secondary transmission rates of SARS-CoV-2 infection among contacts of construction laborers at open air environment	Wrong exposure
	Szablewski, C. M. et al, SARS-CoV-2 Transmission and Infection Among Attendees of an Overnight Camp - Georgia, June 2020	Wrong exposure

Retrieval method	Reference	Reason for exclusion
	Tsuchihashi, Y. et al. High attack rate of SARS-CoV-2 infections during a bus tour in Japan	Cannot ascertain exposure
	Voeten, H. A. C. M. et al. Unraveling the modes of transmission of severe acute respiratory syndrome coronavirus 2 (sars-cov-2) during a nursing home outbreak: Looking beyond the church superspreading event	Wrong exposure
	Vuylsteke, B. et al. The role of airborne transmission in a large single source outbreak of SARS-CoV-2 in a Belgian nursing home in 2020	Wrong exposure
	Wada, K. et al, Infection and transmission of COVID-19 among students and teachers in schools in Japan after the reopening in June 2020	Wrong exposure
	Wagatsuma, K. et al. Genomic Epidemiology Reveals Multiple Introductions of Severe Acute Respiratory Syndrome Coronavirus 2 in Niigata City, Japan, Between February and May 2020	Wrong study design
	Walshe, N. et al. Assessment of Environmental and Occupational Risk Factors for the Mitigation and Containment of a COVID-19 Outbreak in a Meat Processing Plant	Cannot ascertain exposure
	Wang, Q. et al. Aerosol transmission of SARS-CoV-2 due to the chimney effect in two high-rise housing drainage stacks	Wrong study design
	Wang, Z. et al. A coupled Computational Fluid Dynamics and Wells-Riley model to predict COVID-19 infection probability for passengers on long-distance trains	Wrong study design
	Wassendorf, L. et al. Analysis of the Dynamics, Outcome, and Prerequisites of the first German SARS-CoV-2 Superspreading Event	Wrong exposure
	Wilburn, J. et al, COVID-19 within a large UK prison with a high number of vulnerable adults, march to june 2020: An outbreak investigation and screening event	Cannot ascertain exposure
	Wong, L. T. et al. Time-Variant Positive Air Pressure in Drainage Stacks as a Pathogen Transmission Pathway of COVID-19	Wrong study design
	Xie, C. et al, The evidence of indirect transmission of SARS-CoV-2 reported in Guangzhou, China	Wrong exposure
	Xu, P. et al, Lack of cross-transmission of SARS-CoV-2 between passenger's cabins on the Diamond Princess cruise ship	Wrong study design
	Yuan, Y. et al, Molecular epidemiology of SARS-CoV-2 clusters caused by asymptomatic cases in Anhui Province, China	Wrong exposure
	Zhang, J. et al. Transmission of SARS-CoV-2 during air travel: a descriptive and modelling study	Wrong study design
	Zhang, Z. et al, Disease transmission through expiratory aerosols on an urban bus	Wrong study design
	Zollner-Schwetz, I. et al. Analysis of COVID-19 outbreaks in 3 long-term care facilities in Graz, Austria	Wrong exposure
	Zuckerman, N. S. et al, Comprehensive Analyses of SARS-CoV-2 Transmission in a Public Health Virology Laboratory	Wrong exposure
Comber et al, Airborne transmission of SARS-CoV-2 via	Almilaji, O., Air Recirculation Role in the Spread of COVID-19 Onboard the Diamond Princess Cruise Ship during a Quarantine Period	Cannot ascertain exposure
	Bays, D.J. et al, Investigation of nosocomial	Wrong setting

Retrieval method	Reference	Reason for exclusion
aerosols. Rev Med Virol. 2020:e2184	SARS-CoV-2 transmission from two patients to health care workers identifies close contact but not airborne transmission events	
	Cai, J. et al, Indirect Virus Transmission in Cluster of COVID-19 Cases, Wenzhou, China, 2020	Cannot ascertain exposure
	Zhang, R. et al, Identifying airborne transmission as the dominant route for the spread of Covid-19	Wrong study design
	Cheng, V.C.C. et al, Air and environmental sampling for SARS-CoV-2 around hospitalized patients with coronavirus disease 2019 (Covid-19)	Wrong setting
	Chia, P.Y. et al, Detection of air and surface contamination by SARS-CoV-2 in hospital rooms of infected patients	Wrong setting
	Faridi, S et al, A field indoor air measurement of SARS-CoV-2 in the patient rooms of the largest hospital in Iran	Wrong setting
	Fears, A.C. et al, Persistence of severe acute respiratory syndrome coronavirus 2 in aerosol suspensions	Wrong study design
	Guo, Z et al, Aerosol and Surface Distribution of Severe Acute Respiratory Syndrome Coronavirus 2 in Hospital Wards, Wuhan, China, 2020	Wrong setting
	Jiang, Y. et al, Clinical Data on Hospital Environmental Hygiene Monitoring and Medical Staff Protection during the Coronavirus Disease 2019 Outbreak	Wrong setting
	Lei, H et al, SARS-CoV-2 environmental contamination associated with persistently infected COVID-19 patients	Wrong setting
	Liu, Y. et al, Aerodynamic analysis of SARS-CoV-2 in two Wuhan hospitals	Wrong setting
	Ma, J. et al, Exhaled breath is a significant source of SARS-CoV-2 emission	Wrong outcome
	Ong, S.W.X. et al, Air, surface environmental, and personal protective equipment contamination by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) from a symptomatic patient	Wrong outcome
	Razzini, K. et al, SARS-CoV-2 RNA detection in the air and on surfaces in the COVID-19 ward of a hospital in Milan, Italy	Wrong setting
	Santarpia, J.L. et al, Aerosol and Surface Transmission Potential of SARS-CoV-2	Wrong outcome
	Santarpia, J.L. et al, The Infectious Nature of Patient-Generated SARS-CoV-2 Aerosol	Wrong setting
	Schuit, M. et al, Airborne SARS-CoV-2 is rapidly inactivated by simulated sunlight	Wrong study design
	Van Doremalen, N. et al, Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1	Wrong study design
	Wong, J.C.C. et al, Environmental Contamination of SARS-CoV-2 in a Non-Healthcare Setting Revealed by Sensitive Nested RT-PCR	Wrong outcome
	Yamagishi T. et al, Environmental sampling for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) during a coronavirus disease (COVID-19) outbreak aboard a commercial cruise ship	Wrong outcome
	Yu, L. et al, Catch and kill airborne SARS-CoV-2 to control spread of COVID-19 by a heated air disinfection system	Wrong study design

Retrieval method	Reference	Reason for exclusion
	Zhou, L. et al, Detection of SARS-CoV-2 in Exhaled Breath from COVID-19 Patients Ready for Hospital Discharge	Wrong setting
	Zhou, L. et al, Investigating SARS-CoV-2 surface and air contamination in an acute healthcare setting during the peak of the COVID-19 pandemic in London	Wrong setting