EVIDENCE SUMMARY

RESEARCH QUESTION: In the community, what ventilation and air filtration measures should be recommended to prevent COVID-19 transmission?

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RECOMMENDATIONS

Recommendations	Certainty of Evidence	Strength of Recommendation
We recommend the use of natural ventilation* in indoor spaces to prevent COVID-19 transmission, if possible and safe to do so. ** Includes opening doors and windows and electric fans*	-	Good practice statement
We recommend the use of mechanical ventilation systems with appropriate filtration systems** in indoor spaces to prevent COVID-19 transmission if *natural ventilation is not feasible or adequate*. *** Includes HVAC systems and portable air cleaners*	Very low	Strong

Consensus Issues

The Panel opted to issue this good practice statement, despite being based on indirect evidence, due to its perceived net benefits to public health. For both recommendations, the Panel also considered existing recommendations from other regulating authorities in order to be consistent with existing public health practices.

KEY FINDINGS

- Two observational studies compared mechanically ventilation and naturally ventilated areas in schools and hospitals. We also found one randomized crossover trial investigating the effect of HEPA filters in households of individuals with COVID-19.
- Classrooms with mechanical ventilation had lower incidence of COVID-19 compared to those with natural ventilation. There was no significant difference in SARS-CoV-2 detection in bioaerosols between mechanically ventilated and naturally ventilated hospital spaces.
- The addition of HEPA filters in portable air cleaners did not result in a significant difference in SARS-CoV-2 RNA detection in household air samples.
- The overall certainty of evidence is very low due to risk of bias (randomization and allocation concealment issues, inadequate adjustment for confounders) and imprecision.

INTRODUCTION

While epidemiologic evidence shows that COVID-19 is often transmitted through close contacts, fluid mechanics and microbiological findings support the possibility of SARS-CoV-2 spread through aerosols [1]. SARS-CoV-2 RNA has been detected in air samples in some studies, but this does not necessarily mean that the viral particles are capable of infection [2]. Improving ventilation can be an important part of COVID-19 risk mitigation by reducing viral consideration especially as individuals spend over 80% of time indoors [3].

Ventilation is the process of bringing outdoor air indoors and letting out air from inside spaces [4]. This can be done through (1) natural ventilation, such as by opening windows to facilitate cross ventilation, (2) mechanical ventilation using heating, ventilation and air-conditioning (HVAC) or other powered systems, or (3) a hybrid of the two modalities [2]. Meanwhile, most air conditioning units only recirculate indoor air and do not provide ventilation [2].

The World Health Organization recommends a minimum ventilation rate of 10 L per second per person in residential isolation rooms and non-residential settings [2]. In hospitals, a minimum of 60L per second per patient (or 6 air changes per hour) is generally recommended, but much higher rates are required for areas with aerosol-generating procedures [2]. Several modelling studies suggest that increasing ventilation rate, usually above 1-4 air changes per hour, in settings such as offices and classrooms is associated with lower probability of infection and transmission [1].

The Philippine COVID-19 Living Clinical Practice Guidelines earlier suggested the use of carbon dioxide (CO_2) monitors in enclosed spaces to guide strategies to improve ventilation [2]. Additionally, a mathematical modelling study found that the transmission risk of SARS coronavirus, influenza and tuberculosis was negligible (0%) in a scenario with FFP-2 mask and good indoor air quality (400-800 parts per million [ppm] CO_2) in contrast to the use of a medical face mask in a setting with higher indoor CO_2 (110-1500 ppm; transmission risk 13.1%, 29.8% and 4.0% respectively) [3].

Meanwhile, air filtration is not a substitute for ventilation but can help reduce SARS-CoV-2 concentration in the air [4]. Air purifiers with HEPA filters, ultraviolet germicidal filters and ionizers can be used as standalone units or combined with HVAC systems [3]. When minimum ventilation requirements are not met, standalone air cleaners with HEPA filters may be an option [4].

Ventilation and air filtration measures should not be used in isolation but instead considered as part of wider public health measures including face masks and physical distancing [4].

REVIEW METHODS

Electronic searches were conducted on MEDLINE (PubMed) and the Cochrane Library from inception until 2 February 2023 using MeSH terms and text words for COVID-19, SARS-CoV-2, indoor ventilation, air filter, HEPA, HVAC and their variations. COVID-19 transmission was the primary outcome of interest, and surrogate outcomes such as SARS-CoV-2 detection in the air were included. Automated and manual de-duplication of search results was done in EndNote X9. Title and abstract screening were performed with the aid of the Rayyan (www.rayyan.ai) web-based app followed by full-text screening.

Randomized controlled trials and systematic reviews were initially sought but the inclusion criteria were expanded to include observation studies with comparison groups (e.g., cohort studies) due to the paucity of trials. We excluded the following: simulation studies (e.g., computational fluid dynamics), experimental studies with surrogate aerosols or droplets but not SARS-CoV-2, and articles not in English.

A randomized crossover trial was appraised using the Cochrane Risk of Bias tool with additional considerations for carry-over and period effects which are problems that may arise with this study design

[5]. The quality of observational studies was assessed using the Newcastle Ottawa Scale (NOS) for cohort studies and an adapted NOS for cross-sectional studies [6].

A subgroup analysis by setting was planned but there was only one study for each setting (i.e., home, hospital and school). Due to differences in outcome measures and comparisons, a meta-analysis could not be performed, and the results are summarized in a narrative synthesis.

RESULTS

Characteristics of included studies

Of the 55 full-text articles screened, 3 were eligible for inclusion [7-9]. A randomized crossover trial in the United States recruited university employees with COVID-19 who tested positive on saliva polymerase chain reaction (PCR) testing between November 2020 and May 2021 [9]. Half of the participants were within 3 days of being diagnosed with COVID-19, and only two were fully vaccinated. Ten residences (59%) were single-family detached houses, and 65% had heating on with forced air. Each household was provided with one portable air cleaner (Medify Air MA-40) in the primary (self-isolation) room. Households (n=17 primary rooms) were randomized to operate air cleaners with a HEPA filter installed or with the filter removed for a 24-hour period followed by the other intervention. Air samplers then collected total suspended particles in both primary and secondary rooms in the household after each treatment period. Ventilation rates ranged from 4.4-15.4 air changes per hour.

Two observational studies comparing natural and mechanical ventilation were also included. A retrospective cohort study in Italy (n=20,829 students) compared the incidence of SARS-CoV-2 infection among students in either classrooms using mechanical ventilation or natural ventilation systems [7]. This study involved students attending classes in preschool, primary school, middle school and high school between 13 September 2021 and 31 January 2022. Single room ventilation units with heat recovery and filters (F7 or G4) were installed in 316 classrooms. Air flow rates with mechanically ventilated systems (MVS) ranged from 1.4-14L per second per student which are higher than the <1L per second per student typically observed in classrooms with natural ventilation.

In Bangladesh, an analytic cross-sectional study sampled bioaerosols from different areas in nine hospitals (n=86 rooms) between October 2020 and February 2021 [8]. Most rooms with natural ventilation were found to have at least one door open with 40% having evidence of cross-ventilation. Fans were used in nearly half of these rooms while intensive care units (ICUs) had air conditioning units. Naturally ventilated areas had an average of 3.64 air changes per hour or 15.6L per second per person, while the same could not be estimated in rooms with MVS.

Efficacy outcomes

Natural ventilation vs mechanical ventilation

In a large cohort study of schools, the incidence of SARS-CoV-2 infection was one-third lower in classrooms with mechanical ventilation systems compared to naturally ventilated classrooms (RR 0.32 [95% CI 0.23-0.45]). However, this effect estimate is not adjusted for the density of persons in each classroom and SARS-CoV-2 infections were investigated as clusters of cases rather than individual cases [7]. When stratified by the number of students per classroom, the relative risk reduction in cases was greater in large classrooms (85%) compared to medium and small classrooms (63% and 83% respectively).

The proportion of areas with bioaerosol samples positive for SARS-CoV-2 RNA was lower in mechanically ventilated compared to naturally ventilated hospital spaces (22.6% vs 8.3%) but the difference was not statistically significant (OR 0.37 [95% CI 0.09-1.50]) [8].

Air filtration vs no air filtration

The addition of HEPA filters to portable air cleaners resulted in no significant difference in the detection of SARS-CoV-2 RNA in air samples in both primary and secondary rooms (RR 0.57 [95% CI 0.21-1.58] and RR 0.86 [95% CI 0.38-1.95] respectively) in households of adults with COVID-19 [9]. More primary rooms without HEPA filters tested positive for SARS-CoV-2 (44% vs.25%) but small sample sizes contributed to the wide interval estimates.

Additionally, a previous recommendation from the Philippine COVID-19 Living CPG on the use of HEPA filters to improve air quality was based on indirect evidence from laboratory experiments which demonstrated that HEPA filters reduced the concentration of small airborne particles (0.3-1.0 micrometer) [4].

Safety outcomes

None of the studies included reported adverse events with the use of ventilation and/or air filtration. However, the United States Environmental Protection Agency (EPA) cautioned the public to avoid portable air cleaners with ionizers and UV lights with inadequate lamp coatings which can potentially emit ozone which is a known lung irritant [10].

Certainty of evidence

Two studies had moderate risk of bias -- the cross-sectional study [8] lacked adjustment for plausible confounders (e.g., population density per room), while the crossover trial [9] had unclear randomization and allocation sequence concealment. The cohort study had low risk of bias [7]. We also downgraded the certainty of evidence due to imprecise estimates which include the possibility of large benefit and large harm in terms of SARS-CoV-2 RNA detection.

Overall, the certainty of evidence is very low.

RECOMMENDATIONS FROM OTHER GROUPS

We found no clinical practice guidelines on ventilation or air filtration in the context of COVID-19 prevention. However, several government agencies both locally and abroad recommend improving ventilation especially in indoor workplaces.

Group or Agency	Recommendation	Strength of Recommendation/ Certainty/Quality of Evidence
Department of Labor and Employment (DOLE) Guidelines on Ventilation for Workplaces and Public Transport to Prevent and Control the Spread of COVID-19 (Department Order No. 224, series 2021)	Adequate ventilation should be strictly enforced inside the workplace as a preventive measure against spread of COVID-19 virus. Maximize natural ventilation through the use of doors, windows and other openings, if possible and safe to do so. If natural ventilation is not feasible or adequate, fans and air-conditioning system to supply fresh and extract contaminated air shall be used as mechanical ventilation.	-

	Dilution ventilation must be done through use of exhaust fans to achieve an air change rate of 6 to 12 ACH, while maximizing natural ventilation through the use of doors, windows and other openings, if possible and safe to do so. For HVAC systems, outdoor air supply should conform to the recommended breathing zone ventilation rates, for the purpose of general air dilution and comfort control.	
US Centers for Disease Control and Prevention (updated 2 June 2021)	Recommends a layered approach to reduce exposures to SARS-CoV-2, the virus that causes COVID-19. This approach includes using multiple mitigation strategies, including improvements to building ventilation, to reduce the spread of disease and lower the risk of exposure. Increase the introduction of outdoor air Use fans to increase the effectiveness of open windows Rebalance or adjust HVAC systems to increase total airflow to occupied spaces when possible. Use portable high-efficiency particulate air (HEPA) fan/filtration systems to enhance air cleaning (especially in higher risk areas such as a nurse's office or areas frequently inhabited by people with a higher likelihood of having COVID-19 and/or an increased risk of getting COVID-19).	-
UK Government (updated 2 August 2022)	Opening windows and doors at home is the simplest way of improving ventilation for most people. If your home has a mechanical ventilation system, make sure this is working and maintained in line with manufacturers' instructions. Good ventilation can reduce the spread of respiratory infections, including COVID-19, in the workplace and non-domestic settings. Air cleaning devices are not a substitute for good ventilation, however where it is not possible to maintain good ventilation, air cleaning units utilizing HEPA filters or UV technologies could be a useful alternative for reducing airborne transmission of viruses.	
Canada Government	Adequate ventilation can contribute to reducing the risk of COVID-19 transmission in indoor settings	

	One way to improve ventilation is by opening exterior doors and windows for a few minutes, ideally with more than one open at a time. To increase ventilation, run your HVAC system fan continuously at a low speed to provide air movement and filtration without unwanted draft. Within non-residential buildings, run the system for 2 hours at maximum outside airflow before and after the building is occupied.	
Netherlands National Institute for Public Health and the Environment (updated 15 March 2023)	• Ventilate indoor spaces 24 hours a day • Use and maintain the ventilation system according to the user manual • Check that the ventilation capacity for the space is suitable for how it is being used • Consult an expert if you are unsure whether ventilation is sufficient • Air out indoor spaces regularly (between meetings or classes, during breaks).	

ONGOING STUDIES AND RESEARCH GAPS

We found one trial on air filtration and ventilation improvement that is currently ongoing enrollment by invitation in California, USA [11]. This cluster RCT is investigating the use of a filtration fan with MERV16 filter in each room and its effect on COVID-19 incidence, upper respiratory symptoms, and carbon dioxide levels.

ADDITIONAL CONSIDERATIONS FOR EVIDENCE TO DECISION (ETD) PHASE

COST

No local cost-effectiveness analysis on ventilation or air filtration for COVID-19 prevention was found. However, a cost-effectiveness study set in New York City, USA modeled the effect of standalone HEPA filtration units in a standardized space (poorly ventilated restaurant with 1,000 square foot space) using a Monte Carlo simulation [12]. However, this analysis was for a high-income country and assumed that symptomatic COVID-19 cases quarantined for 14 days which is probably longer than current practice. It also assumed a 2% prevalence of COVID-19 and that 70% of the population were fully vaccinated.

The cost of air cleaners varies according to brand and specifications. The Medify MA-40 air purifier used in the crossover trial costs ₱45,079 (desertcart.ph) while its HEPA filter replacement costs ₱1,276 (lazada.com.ph) [9].

PATIENT'S VALUES AND PREFERENCE, EQUITY, ACCEPTABILITY, AND FEASIBILITY

We found no research evidence on the values and preferences of Filipinos with respect to indoor ventilation or air filtration.

However, more than 90% of Taiwan residents in a survey (n=1,206) were cognizant of COVID-19's transmissibility through the air and that high carbon dioxide and poor ventilation increase the risk of infection [13]. In an online survey in England during the autumn season (n=10,207), only 58.5% of respondents frequently or very frequently opened windows in the last week [14].

A survey of dentists in the United States (n=151) found that 54.8% of respondents believe that HEPA filters, UV lights, extraoral suctions and PAPRs would reduce COVID-19 transmission in their dental practice [15]. Similarly, 54.6% have bought at least one HEPA filter for their dental office during the pandemic.

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APPENDICES

Appendix 1: Preliminary Evidence to Decision

Table 1. Summary of initial judgements prior to the panel discussion (N=6/9)

FACTORS	JUDGEMENT						RESEARCH EVIDENCE/ADDITIONAL CONSIDERATIONS
Problem	No	Yes (N=6)	Varies		Uncertain		While epidemiologic evidence shows that COVID-19 is often transmitted through close contacts, fluid mechanics and microbiological findings support the possibility of SARS-CoV-2 spread through aerosols. SARS-CoV-2 RNA has been detected in air samples in some studies, but this does not necessarily mean that the viral particles are capable of infection. Improving ventilation can be an important part of COVID-19 risk mitigation by reducing viral consideration especially as individuals spend over 80% of time indoors.
Benefits	Large (N=3)	Moderate (N=1)	Small (N=1)	Trivial	Varies (N=1)	Uncertain	No eligible studies found
Harms	Large (N=2)	Moderate	Small (N=3)	Trivial	Varies (N=1)	Uncertain	None of the studies included reported adverse events with the use of ventilation and/or air filtration. However, the United States Environmental Protection Agency (EPA) cautioned the public to avoid portable air cleaners with ionizers and UV lights without inadequate lamp coatings which can potentially emit ozone which is a known lung irritant.

Balance of Benefits and Harms	Favors diagnostic/ treatment (N=2)	Probably favors diagnostic/treatment (N=2)	Does not favor diagnostic/treatment or no diagnostic/treatment	Probably favors no diagnostic/treatment (N=1)	Favors no diagnostic/treatment	Varies (N=1)		**Desirable effects** Based on low certainty evidence from 1 cohort study (n = 20,829), the risk of SARS-CoV-2 infection among students was lower in classrooms with mechanical ventilation systems than in classrooms with natural ventilation (RR 0.31 [95% CI 0.23 to 0.45]). Based on very low certainty evidence from 1 cross-sectional study, there was no significant difference in SARS-CoV-2 RNA detection in air samples among hospital areas with mechanical ventilation and natural ventilation (RR 0.37 [95% CI 0.09 to 1.50]). Based on very low certainty evidence from 1 randomized crossover trial (n = 31 rooms), there was no significant difference in SARS-CoV-2 RNA detection in air samples among rooms with portable air cleaners with and without HEPA filters in both primary (RR 0.57 [95% CI 0.21 to 1.58]) and secondary rooms (RR 0.50 [95% CI 0.38 to 1.95]). **Undesirable effects** None of the studies included reported adverse events with the use of ventilation and/or air filtration
Certainty of Evidence	No included studies	Very low (N=4)	Low (N=2)	Moderate	High			No evidence found
Accuracy	Very Accurate	Accurate (N=1)	Inaccurate	Very Inaccurate	Varies (N=1)	Don’t Know (N=2)	Others: Undecided (N=1) Not Applicable (N=1)	Not applicable

Values	Important uncertainty or variability (N=1)	Possibly important uncertainty or variability (N=4)	Possibly NO important uncertainty or variability		No important uncertainty or variability (N=1)			We found no research evidence on the values and preferences of Filipinos with respect to indoor ventilation or air filtration. However, more than 90% of Taiwan residents in a survey (n = 1,206) were cognizant of COVID-19's transmissibility through the air and that high carbon dioxide and poor ventilation increase the risk of infection. In an online survey in England during the autumn season (n = 10,207), only 58.5% of respondents frequently or very frequently opened windows in the last week
Resources Required	Don't Know	Varies (N=1)	Large costs (N=2)	Moderate costs (N=2)	Negligible costs or savings	Moderate savings	Large savings (N=1)	The cost of air cleaners varies according to brand and specifications. The Medify MA-40 air purifier used in the crossover trial [9] costs P45,079 (desertcart.ph) while its HEPA filter replacement costs ₱1,276 (lazada.com.ph).
Certainty of evidence of required resources (costs)	No included studies (N=3)	Very low (N=1)	Low (N=1)		Moderate	High	Others: Undecided (N=1)	No research evidence for local resource requirements were found. Unit prices for the air cleaner and HEPA filter come from online retailers
Cost effectiveness	No included studies	Favors the comparator	Probably favors the comparator (N=1)	Does not favor either the interventio n or the comparator	Probably favors the intervention (N=4)	Favors the intervention	Varies (N=1)	No local cost-effectiveness analysis on ventilation or air filtration for COVID-19 prevention was found. However, a cost-effectiveness study set in New York City, USA modeled the effect of standalone HEPA filtration units in a standardized space (poorly ventilated restaurant with 1,000 square foot space) using a Monte Carlo simulation. [12] An improvement in ventilation to 12 air changes per hour prevented 54 (95% credible interval [CrI] 29 to 86) aerosol infections in one year and resulted in cost savings ($152,701 [95% CrI USD 80,663 to 249,501). However, this analysis was for a

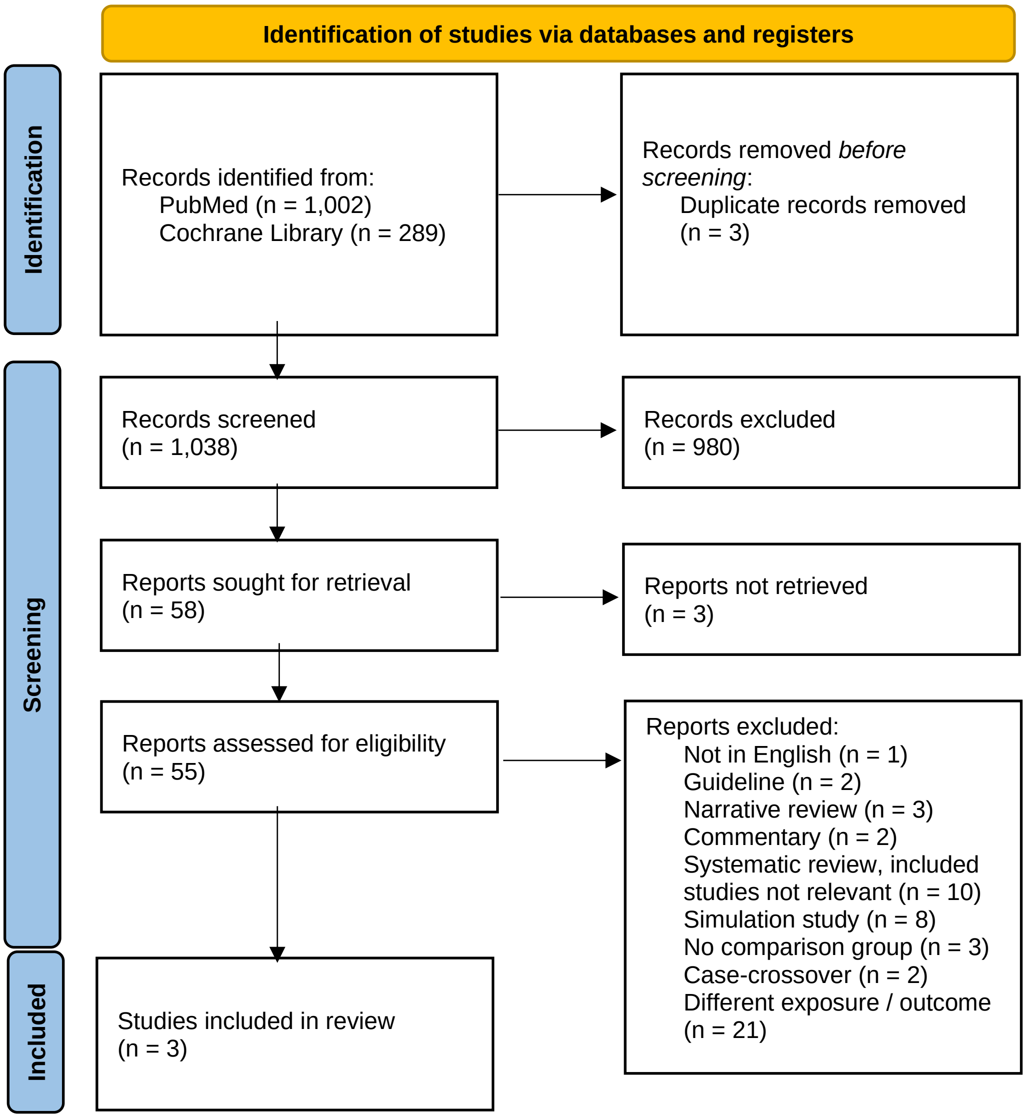
								high-income country and assumed that symptomatic COVID-19 cases quarantined for 14 days which is probably longer than current practice. It also assumed a 2% prevalence of COVID-19 and that 70% of the population were fully vaccinated.
Equity	Don't Know (N=2)	Varies	Reduced (N=1)	Probably reduced (N=1)	Probably No Impact	Probably Increased (N=2)	Increased	No research evidence was found
Acceptability	Don't Know (N=1)	Varies (N=1)	No		Probably no	Probably yes (N=4)	Yes	No local studies on acceptability was found. A survey of dentists in the United States (n = 151) found that 54.8% of respondents believe that HEPA filters, UV lights, extraoral suctions and PAPRs would reduce COVID-19 transmission in their dental practice. Similarly, 54.6% have bought at least one HEPA filter for their dental office during the pandemic.
Feasibility	Don't Know	Varies	No		Probably no (N=1)	Probably yes (N=4)	Yes (N=1)	No research evidence was found.

Appendix 2: Search Strategy

DATABASE	SEARCH STRATEGY / SEARCH TERMS	DATE AND TIME OF SEARCH	RESULTS	
			Yield	Eligible
MEDLINE (PubMed)	(((((("Ventilation"[Mesh]) OR ("Air Filters"[Mesh])) OR (air filter[Title/Abstract])) OR (HEPA[Title/Abstract])) OR (HVAC[Title/Abstract])) OR (((indoor[Title/Abstract]) OR (room[Title/Abstract])) AND (ventilation[Title/Abstract]))) AND ((("SARS-CoV-2"[Mesh] OR "COVID-19"[Mesh]) OR (COVID-19[Title/Abstract])) OR (coronavirus[Title/Abstract]))	2 February 2023, 14:09 (GMT+8)	1,002	3
Cochrane Library	#1 MeSH descriptor: [COVID-19] explode all trees 3750 #2 MeSH descriptor: [SARS-CoV-2] explode all trees 2112 #3 COVID-19 OR coronavirus 14941 #4 #1 OR #2 OR #3 14942 #5 MeSH descriptor: [Ventilation] explode all trees 102 #6 MeSH descriptor: [Air Filters] explode all trees 48 #7 ventilation AND (indoor OR room) 2157 #8 (air filter) OR HEPA OR HVAC 857 #9 #5 OR #6 OR #7 OR #8 3006 #10 #4 AND #9 289	2 February 2023, 16:06 (GMT+8)	289	0
ClinicalTrials.gov	indoor ventilation OR filtration | COVID-19	20 April 2023, 2:09 (GMT+8)	64	1

Appendix 3: PRISMA Diagram

PRISMA Study Flow Diagram



Appendix 4: Characteristics of Included Studies

Study ID	Study design	Country / Setting	Sample Size	Population	Intervention Group(s)	Control	Outcomes
Buonanno 2022	Retrospective cohort study	Italy / School	20,829 students	Students attending classes between 13 September 2021 and 31 January 2022 at different levels (preschool, primary school, middle school, high school)	Mechanical ventilation systems (316 classrooms): single room ventilation units equipped with heat recovery units and filters (F7 or G4)	Natural ventilation systems (10,125 classrooms)	Incidence of SARS-CoV-2 infection
Styczynski 2022	Cross-sectional, analytic	Bangladesh / Hospital	86 rooms	Hospital areas including open wards, OPDs, bathrooms, COVID-19 testing areas, canteen in 3 private hospitals in Dhaka between October 2020 and February 2021	Mechanically ventilated rooms (24 rooms)	Naturally ventilated rooms (62 rooms)	Bioarosole samples positive for SARS-CoV-2 RNA
Myers 2022	Randomized crossover trial	USA / Home	17 rooms	Adults positive on COVID-19 PCR saliva testing (Rutgers University employees) between November 2020 and May 2021	Portable air cleaner (Medify Air MA-40) with HEPA filter in the primary room	Portable air cleaner with no HEPA filter in the primary room	Bioarosole samples positive for SARS-CoV-2 RNA

Appendix 5: GRADE Evidence Profiles

Author(s): Cary Amiel G. Villanueva, MD, MPH
Question: Mechanical ventilation compared to natural ventilation for COVID-19 prevention
Setting: Indoor areas
Bibliography: Buonanno G, Ricolfi L, Morawska L, Stabile L. Increasing ventilation reduces SARS-CoV-2 airborne transmission in schools: A retrospective cohort study in Italy's Marche region. Front Public Health. 2022;10:1087087.Styczynski A, Hemlock C, Hoque KI, Verma R, LeBoa C, Bhuiyan MOF, et al. Assessing impact of ventilation on airborne transmission of SARS-CoV-2: a cross-sectional analysis of naturally ventilated healthcare settings in Bangladesh. BMJ Open. 2022;12(4):e055206.

Certainty assessment							Summary of findings				
							Study event rates (%)			Anticipated absolute effects	
Participants (studies) Follow-up	Risk of bias	Inconsistency	Indirectness	Imprecision	Publication bias	Overall certainty of evidence	With natural ventilation	With mechanical ventilation	Relative effect (95% CI)	Risk with natural ventilation	Risk difference with mechanical ventilation
SARS-CoV-2 infection (assessed with: students)											
20829 (1 observational study)	not serious	not serious	not serious	not serious	none	⊕⊕◯◯ Low	3090/20196 (15.3%)	31/633 (4.9%)	**RR 0.32** (0.23 to 0.45)	153 per 1,000	**104 fewer per 1,000** (from 118 fewer to 84 fewer)
Bioaerosol samples positive for SARS-CoV-2 RNA (assessed with: rooms)											
86 (1 observational study)	serious[a]	not serious	not serious	very serious[b]	none	⊕◯◯◯ Very low	14/62 (22.6%)	2/24 (8.3%)	**RR 0.37** (0.09 to 1.50)	226 per 1,000	**142 fewer per 1,000** (from 205 fewer to 113 more)

CI: confidence interval; **RR:** risk ratio

Explanations

a. No adjustment for confounders such as population density
b. The confidence interval includes the possibility of large benefit and large harm.

Author(s): Cary Amiel G. Villanueva, MD, MPH
Question: Air filtration compared to no filtration for COVID-19 prevention
Setting: Indoor areas
Bibliography: Myers NT, Laumbach RJ, Black KG, Ohman-Strickland P, Alimokhtari S, Legard A, et al. Portable air cleaners and residential exposure to SARS-CoV-2 aerosols: A real-world study. Indoor Air. 2022;32(4):e13029.

Certainty assessment							Summary of findings				
Participants (studies) Follow-up	Risk of bias	Inconsistency	Indirectness	Imprecision	Publication bias	Overall certainty of evidence	Study event rates (%)		Relative effect (95% CI)	Anticipated absolute effects	
							With no filtration	With air filtration		Risk with no filtration	Risk difference with air filtration
Bioaerosoles positive for SARS-CoV-2 RNA (assessed with: primary household room)											
32 (1 RCT)	serious[a]	not serious	not serious	very serious[b]	none	⊕◯◯◯ Very low	7/16 (43.8%)	4/16 (25.0%)	**RR 0.57** (0.21 to 1.58)	438 per 1,000	**188 fewer per 1,000** (from 346 fewer to 254 more)
Bioaerosoles positive for SARS-CoV-2 RNA (assessed with: secondary household room)											
30 (1 RCT)	serious[a]	not serious	not serious	very serious[b]	none	⊕◯◯◯ Very low	7/15 (46.7%)	6/15 (40.0%)	**RR 0.50** (0.38 to 1.95)	467 per 1,000	**233 fewer per 1,000** (from 289 fewer to 443 more)

CI: confidence interval; **RR:** risk ratio

Explanations

a. Unclear randomization and allocation sequence concealment
b. The confidence interval includes the possibility of large benefit and large harm.