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## Supplemental Methods. Detailed protocol

### Protocol

#### Respiratory protective equipment for health care workers: Systematic review and meta-analysis of evidence of N95 filtering facepiece respirators versus surgical mask protection from acute respiratory infection

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### 2.0 Objectives

To identify and synthesize evidence of N95 respirators compared to surgical masks to prevent acute respiratory infections (ARIs) when worn by health care workers (HCWs).

### 3.0 Methods

To ensure consistency and avoid bias in the review process the methods regarding search strategy, study selection, risk of bias and quality assessment of studies, data extraction and data analysis will be determined prior to data collection.

### 3.1 Search strategy

The following databases will be searched for pertinent studies (Appendix A): MEDLINE, EMBASE, Database of Abstracts of Reviews of Effects, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, Health Technology Assessment, Collective Index of Nursing and Allied Health Literature, PsycINFO, SCOPUS, and reference scan of reviews from the past 5 years and included primary articles for additional studies for inclusion. Grey literature searches will be performed for unpublished data by searching organizational websites responsible for guidance documents, policies, and certification of respirators and surgical masks.

### **3.2 Selection of studies**

Studies will be selected based on a set of eligibility criteria that will be defined prior to performing the search.

#### **3.2.1 Eligibility criteria**

Eligibility criteria will cover various aspects including types of studies, types of articles, types of participants, types of interventions and comparators, types of outcomes measured, date of publication, and exclusion criteria.

##### **3.2.1.1 Types of studies**

The types of studies that will be included are randomized controlled trials, cohort, case-control and surrogate exposure studies (i.e. experiments involving manikins or volunteers exposed to artificially produced aerosols).

##### **3.2.1.2 Types of articles**

Primary literature will be assessed for inclusion. Reviews will be considered for reference searching, but not included in the systematic review. Grey literature will be assessed to find unpublished data from conference abstracts.

The following conferences will be searched for relevant abstracts: American Industrial Hygiene Conference and Exposition (AIHce), American Society for Healthcare Risk Management (ASHRM) Annual Conference and Exhibition, International Congress of the Asia Pacific Society of Infection Control (APSIC), Association for Professionals in Infection Control and Epidemiology (APIC) Annual Conference, Association of Medical Microbiology and Infectious Disease Canada (AMMI) – Canadian Association for Clinical Microbiology and Infectious Diseases (CACMID) Annual Conference, Australasian College for Infection Prevention and Control (ACIPC) Annual Conference, Australasian Society for Infectious Diseases (ASID) Annual Scientific Meeting, The Australian Society for Microbiology Annual Scientific Meeting, American Society for Microbiology (ASM) Biodefense and Emerging Diseases Conference, American Society for Microbiology (ASM) General Meeting, American Thoracic Society (ATS) Conference, Congress of the European Rhinologic Society (ERS), European Congress of Clinical Microbiology and Infectious Diseases (ECCMID), Healthcare Infection Society (HIS) International Conference, Hong Kong Infection Control Nurses' Association (HKICNA) International Infection Control Conference, Infectious Diseases Society of America (IDSA) Annual Meeting, Infection Prevention and Control (IPAC) Canada National Education Conference (formerly CHICA), Infection Prevention Society (IPS) Annual Conference, International Conference on Prevention and Infection Control (ICPIC), International Congress on Infectious Diseases (ICID), Congress of the International Federation of Infection Control (IFIC), International Meeting on Emerging Diseases and Surveillance (IMED), International Union of Microbiological Societies (IUMS) Congresses (Bacteriology, Virology and Mycology), and Society for Healthcare Epidemiology of America (SHEA) Annual Meeting.

We will search for publication of conference abstracts obtained through our grey literature search. If a conference abstract has been published, the conference abstract will not be used for data extraction or analysis to avoid duplication of data. Conference abstracts that have been published will be used to assess reporting bias. Unpublished conference abstracts will be used in funnel plots to assess publication bias.

##### **3.2.1.3 Types of participants**

Articles will ideally have health care workers as participants in a health care setting. Health care workers is implied as a broad term for any workers that are exposed to patients with ARI. Studies with manikins or volunteers in a simulated health care setting will also be considered. Animal models and studies solely involving protection of patients or community populations will be excluded.

##### **3.2.1.4 Types of interventions**

Study designs will assess the use of National Institute for Occupational Safety and Health (NIOSH) certified N95 filtering facepiece respirators compared to surgical masks. Certification must be under Title 42 CFR Part 84. Respirators certified under the former Title 30 CFR Part 11 are ineligible. European standard filtering facepiece (FFP2) respirator data will be included as N95 filtering facepiece respirator data. Elastomeric facepiece respirators will not be included because these respirators are not in widespread use in health care settings. The term surgical mask is considered equivalent to procedural masks, isolation masks, laser masks, fluid resistant masks, and face masks with particle filtration efficiencies of 95% or greater and bacterial filtration efficiencies of 95% or greater. Surgical masks must be Food and Drug Administration (FDA) approved, or have an equivalent certification for use as a medical device, otherwise the surgical masks used cannot be considered suitable as a medical device for use in a hospital setting. Other types of respirators and surgical masks not explicitly included above will be excluded.

### **3.2.1.5 Types of comparisons**

Studies must contain a comparison of eligible respirators to eligible surgical masks outlined in section 3.2.1.4.

### **3.2.1.6 Types of outcomes measured**

Outcomes measured will depend on the study design.

Randomized controlled trials: laboratory-confirmed respiratory infection (polymerase chain reaction (PCR) of respiratory viruses and *B. pertussis*, serology-confirmed respiratory viruses and *B. pertussis*, viral culture, pertussis bacterial culture), influenza-like illness (ILI), and workplace absenteeism due to hospital acquired respiratory infections.

Case-control and cohort studies: laboratory-confirmed respiratory infection (PCR of respiratory viruses and *B. pertussis*, serology-confirmed respiratory viruses and *B. pertussis*, viral culture, pertussis bacterial culture), influenza-like illness (ILI), and workplace absenteeism due to hospital acquired respiratory infections.

Surrogate exposure studies: surrogate measures of protection include filter penetration, face-seal leakage, and total inward leakage. Viability of bioaerosols is of interest for comparative study designs with bioaerosols used as challenge particles. Lastly, the distribution of size of particles penetrating respirators and surgical masks will be recorded if measured. Other outcomes for surrogate exposure studies not explicitly reported here that could not be foreseen and are deemed important for inclusion will also be extracted.

### **3.2.1.7 Date of publication**

Articles published since January 01, 1990 will be considered for inclusion. This date marks 4 years prior to when N95 respirators became a part of standard HCW respiratory protective equipment in the United States due to a policy put in place by Occupational Safety and Health Administration (OSHA) as a response to HCW exposure to drug-resistant TB. Four years is a reasonable period of time to capture articles that informed the decision to implement standard use of N95 respirators in health care settings.

The grey literature search for conference abstracts will be limited to the past 5 years. We expect abstracts prior to 5 years would already be published as full papers. We recognize that abstracts from conferences may be irretrievable. A summary of conference abstracts obtained and unobtainable will be provided as an appendix.

### **3.2.1.8 Exclusions**

The following will be criteria for exclusion: case series, case reports, opinions, commentary, letter to editor, or any other study designs that are not listed in section 3.2.1.1, not peer-reviewed, not English language, not using eligible respiratory protective equipment described in section 3.2.1.4, facial protection described in section 3.2.1.4 is not compared for any relevant outcome, only patient protection, only use of masks/respirators in public population settings, only prevention of transmission from patients (patients donning masks/respirators), use of masks or

respirators not related to protection against ARIs (i.e. prevention of surgical site infections, bloodborne pathogen infection prevention, and surgical smoke), and animal models. Note: non-English language articles will be filtered at the level of the search strategy.

### **3.2.2 Coding screening**

During the screening process the reviewers will code articles as “include”, “exclude” or “unsure”. These three categories will be used for calculating the Kappa statistic.

For the purpose of producing a study flow diagram the reviewers will code excluded studies numerically according to the reason for exclusion. In the event that reviewers select differing reasons for exclusion, the reason for exclusion assigned to an article and reported in the flow diagram will reflect the lowest numerical value assigned. The lowest numerical value corresponds to the highest priority reason for exclusion in the hierarchy of reasons for exclusion:

1. Not related to protection against ARIs
2. Neither a randomized controlled trial, cohort, case-control nor surrogate exposure study
3. Lack of comparison of eligible interventions
4. Improper participant population
5. Not peer-reviewed

### **3.2.3 Screening of studies**

Two reviewers will independently screen studies based on the eligibility criteria defined in section 3.2.1. First, titles and abstracts will be screened for eligibility. A kappa statistic will be calculated to determine agreement of the reviewer’s designation of inclusion or exclusion of primary articles. A kappa statistic of > 0.60 will be considered good agreement. If the kappa statistic is less than 0.60, the reviewers will discuss reasons for disagreement and revisit any eligibility criteria found to be related to the disagreement. Any changes to the protocol arising from this discussion will be reported. Next, full text screens will be completed on all titles and abstracts coded as include or unsure by at least 1 reviewer. Only full texts coded as include by both reviewers will be included in data extraction and analysis. In the event of a disagreement between reviewers for inclusion of full texts for data extraction and analysis the reviewers will attempt to reach consensus. A third reviewer for arbitration will be assigned if consensus cannot be reached between the first two reviewers.

### **3.3 Reference database**

All references will be documented and stored using RefWorks.

### **3.4 Data extraction**

A unified data extraction template will be used based on a piloted subset of articles. Data extraction will occur prior to quality assessment and only for studies that are slated for final inclusion. Data will be extracted independently by two reviewers. The data obtained from studies includes information pertinent to statistical data as well as general information about the study: location of study, study design, aim/objective, methodology information, respirator/mask types and number of participants allocated to each intervention, reported findings/conclusions and statistical analysis, and risk of bias/confounders/limitations. Best efforts to contact first authors or corresponding authors for additional information or missing data will be made when necessary.

### **3.5 Quality assessment**

Outcome-specific quality of the body of evidence will be assessed using the GRADE framework. Quality using GRADE is reported as high quality, moderate quality, low quality and very-low quality.<sup>1</sup>

Risk of bias analysis will be included in the assessment of study design. Randomized controlled trials will be explicitly assessed for selection bias, performance bias, detection bias, attrition bias, reporting bias, and other sources of bias (i.e. recruitment bias for cluster-randomization) according to the Cochrane Risk of Bias Tool.<sup>2</sup> Cohort and case-control studies will be assessed for risk of design-specific bias using each respective Newcastle-Ottawa Scale.<sup>3</sup>

Confounding variables predicted to influence protection from ARI include compliance with use of intervention, vaccination status, proper selection of respirator or surgical mask, fit testing of respirator and user seal check, use of other PPE and hand hygiene, engineering and administrative controls that differ between populations, and proper donning and doffing techniques of respirators and surgical masks. Potential confounders will be assessed per study.

Quality of the studies will be considered during the discussion of outcomes and used in sensitivity analysis. Risk of bias will be used for pooling randomized controlled trials for meta-analysis.

### **3.6 Data analysis**

The applicability of the surrogate measures from surrogate exposure studies are currently unclear and will be interpreted with caution. Similarly, observational studies will be approached with caution. We intend to make conclusions on the best available evidence (i.e. current data from randomized controlled trials). The purpose of including surrogate exposure studies will be to demonstrate the direction of the potential effect of respirator and surgical mask use on the rates of ARI and the theoretical protection in terms of surrogate measures.

Review Manager ((RevMan) [Computer program]. Version 5.2. Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2012) will be used for data analysis.

#### **3.6.1 Meta-analyses**

Meta-analyses of cohort studies, case-control studies, and RCTs, separately, will be conducted. Data will be measured on dichotomous outcomes (confirmed respiratory infection by PCR, serology or culture, and ILI) and continuous outcomes (workplace absenteeism). Random-effects meta-analysis for dichotomous outcomes (inverse variance) will be used. Inverse variance random-effects method will be used for meta-analysis of continuous outcomes. Surrogate exposure studies will be omitted from meta-analysis and will instead be discussed narratively because the methodologies are highly variable and outcomes measured are not all the same.

#### **3.6.2 Data pooling and statistical analysis**

Randomized controlled trials and observational studies will be eligible for pooling and meta-analysis. Case-control studies and cohort studies with study design features that are drastically different will not be pooled. Where data can be combined for meta-analyses, these data will be reported as odds ratios. Adjusted odds ratios will be used whenever available. Odds ratio effect measure with 95% confidence intervals will be used as a summary statistic presented on forest plots. For data reported as hazard ratios, risk ratios or otherwise, the data will be converted to odds ratios for pooling. Where data cannot be or will not be combined for meta-analyses, a narrative discussion of data will be provided. Each outcome measure will be pooled and analyzed separately. These outcomes are described in section 3.2.1.5.

If an adjusted value is not already reported, cluster-randomized controlled trials will be adjusted for meta-analysis with individual-randomized controlled trials. The intraclass correlation coefficient (ICC) will be used to determine the design effect. The design effect will be used to determine the effective sample size. When the effective sample size is not a whole number, the effective sample size will be rounded to the nearest whole number.

Similar intervention groups in multi-arm clinical trials will be grouped. For example, a clinical trial could compare non-fit tested N95 and fit tested N95 to surgical masks. The N95 arms would be grouped.

For meta-analyses involving rare events, any zero-cell count events will be adjusted by including a correction that is the reciprocal of the size of the contrasting study arm<sup>4</sup>.

### **3.6.3 Assessment of heterogeneity**

Studies will be stratified by risk of bias rating. Significant heterogeneity of studies is detected using  $\chi^2$  (chi-square) and  $I^2$  values:  $\chi^2$  of  $<0.10$  or an  $I^2$  statistic of  $>50\%$  will reflect significant heterogeneity.<sup>5,6</sup> Given the knowledge of the dearth of information available on this topic, subgroup analysis will be performed only if there are more than 5 pooled studies and when significant heterogeneity is present. Subgroup analysis will be performed temporally (during an outbreak, during a seasonal timeframe of a particular ARI under study, or timeframes that do not fall in the former two categories), nurses and other health care workers, regions of positive community view on mask usage and neutral, unknown or negative views on mask usage, and studies accounting for community acquired respiratory infections and studies that do not account for community acquired respiratory infections. If heterogeneity exists, laboratory-confirmed respiratory infections will each be further subdivided by viral and bacterial etiology.

### **3.6.4 Sensitivity analysis**

Studies that are assigned as very low or low quality, use unadjusted statistics or have inadequate adjustment for confounders will be set as an exclusion for secondary meta-analysis.

### **Deviations from Protocol**

We had intended to solely include surgical masks that were FDA approved or certified for use as a medical device. However, we were unable to confirm certification of all surgical masks in included studies, but did not exclude data from those surgical masks.

Two post-hoc meta-analyses were requested by editors. Specifically, to pool observational studies, and, for the purpose described in the paper, to pool all study designs.

**S1 Table. Ovid MEDLINE® In-Process & Other Non-Indexed Citations and Ovid MEDLINE®**

#	Searches
1	Masks/ or Protective Devices/ or Respiratory Protective Devices/
2	(masks or mask or facemask\$ or respirator or respirators or N95 or FFP2 or "personal protection equipment" or "personal protective equipment").ti,ab,kf.
3	1 or 2
4	Aerosols/ or Particle Size/ or Particulate Matter/ or Adenovirus Infections, Human/ or Adenoviruses, Human/ or Bacteria/ or Bacterial Infections/ or Bordetella Infections/ or Bordetella pertussis/ or Chickenpox/ or Communicable Diseases, Emerging/ or Communicable Diseases/ or Coronavirus Infections/ or Coronavirus/ or Disease Outbreaks/ or exp Cross Infection/ or exp Disease Transmission, Infectious/ or exp Haemophilus influenzae/ or exp Orthomyxoviridae/ or exp Pneumonia, Bacterial/ or exp Pneumovirus Infections/ or exp Respiratory Tract Infections/ or exp Respirovirus Infections/ or Gram-Negative Bacterial Infections/ or Herpesvirus 3, Human/ or Infection Control/ or Infection/ or Influenza, Human/ or Metapneumovirus/ or Paramyxoviridae Infections/ or Pneumonia, Viral/ or Pneumonia/ or Respiratory Syncytial Virus Infections/ or Respiratory Syncytial Virus, Human/ or Respiratory Syncytial Viruses/ or Respiratory Tract Diseases/ or Rhinovirus/ or SARS Virus/ or Severe Acute Respiratory Syndrome/ or transmission.fs. or Virus Diseases/ or Viruses/ or Whooping Cough/
5	(particle\$ or "particulate matter" or aerosol\$ or bioaerosol\$ or (acute adj2 respiratory) or adenovirus\$ or airborne\$ or ARI or bacteri\$ or chickenpox or "chicken pox" or communicable\$ or coronavirus or CRI or cross infect\$ or disease\$ or droplet\$ or (emerg\$ adj2 pathogen\$) or epidemic\$ or flu or H1N1 or haemophilus or "health care acquired" or "health care associated" or "healthcare acquired" or "healthcare associated" or "hospital acquired" or "hospital associated" or HiB or ILI or illness\$ or incidence or infect\$ or influenza\$ or measles or MERS or metapneumovirus\$ or "Middle East respiratory syndrome" or nosocomial or orthomyxoviridae or outbreak\$ or pandemic\$ or parainfluenza or paramyxoviridae or particle\$ or pathogen\$ or pneumonia\$ or (respiratory adj2 disease\$) or (respiratory adj2 illness\$) or (respiratory adj2 infection\$) or "respiratory hygiene" or ("respiratory syncytial" adj1 virus\$) or "respiratory tract" or rhinovirus or RSV or SARS or "severe acute respiratory syndrome" or sick\$ or syncytial or transmission or varicella or viral or virion\$ or virus\$ or pertussis or "whooping cough").ti,ab,kf.
6	4 or 5
7	Filtration/ or exp Occupational Exposure/ or Inhalation Exposure/ or exp Microbial Viability/
8	("face seal" or faceseal or face-seal or filter\$ or filtrat\$ or leak\$ or penetrat\$ or "viral viability" or "viral culture" or "bacterial culture" or WPF or APF or SWPF or "protection factor" or "5th percentile" or "bacteria\$ viability" or "virus viability" or "virus culture").ti,ab,kf.
9	7 or 8
10	exp Health Personnel/
11	(doctor\$ or physician\$ or clinician\$ or nurse\$ or nursing or paramedic\$ or ((health\$ or hospital\$ or nurs\$ or clinical or care or medical\$) adj2 (practitioner\$ or staff or personnel or worker\$ or employee\$ or provider\$ or professional\$)) or HCW or HCP).ti,ab,kf.
12	10 or 11
13	Manikins/ or "Nebulizers and Vaporizers"/
14	("breathing simulator" or "cascade impaction" or (air adj sampler\$) or "head form\$" or headform\$ or "head-form\$" or airtight or chamber\$1 or hood\$1 or man?equin\$ or man?ikin\$ or nebulizer\$ or simulat\$ or surrogate\$ or human\$ or volunteer\$ or subject\$).ti,ab,kf.
15	13 or 14
16	3 and (6 or 9) and (12 or 15)
17	limit 16 to english language
18	limit 17 to yr="1990 -Current"
19	remove duplicates from 18



## S2 Table. EMBASE

#	Searches
1	exp mask/ or face mask/ or surgical mask/ or protective equipment/ or ventilator/
2	(masks or mask or facemask\$ or respirator or respirators or N95 or FFP2 or "personal protection equipment" or "personal protective equipment").ti,ab,kw.
3	1 or 2
4	aerosol/ or particle size/ or particulate matter/ or human adenovirus infection/ or human adenovirus/ or bacterium/ or bacterial infection/ or chickenpox/ or communicable disease/ or Coronavirus infection/ or Coronavirus/ or SARS coronavirus/ or cross infection/ or hospital infection/ or airborne infection/ or healthcare associated infection/ or epidemic/ or pandemic/ or disease transmission/ or virus transmission/ or bacterial transmission/ or exp Haemophilus influenzae/ or exp Orthomyxovirus/ or bacterial pneumonia/ or pneumonia/ or virus pneumonia/ or exp infectious pneumonia/ or severe acute respiratory syndrome/ or exp Pneumovirus infection/ or exp respiratory tract infection/ or respiratory tract disease/ or exp Respirovirus infection/ or Rhinovirus infection/ or exp Human rhinovirus/ or Rhinovirus/ or Respiratory syncytial pneumovirus/ or respiratory syncytial virus infection/ or exp influenza/ or infection/ or infection control/ or infection prevention/ or infection risk/ or paramyxovirus infection/ or virus infection/ or virus/ or Varicella zoster virus/ or metapneumovirus/ or human metapneumovirus/ or Gram negative infection/ or pertussis/ or Bordetella pertussis/ or bordetellosis/
5	(particle\$ or "particulate matter" or aerosol\$ or bioaerosol\$ or (acute adj2 respiratory) or adenovirus\$ or airborne\$ or ARI or bacteri\$ or chickenpox or "chicken pox" or communicable\$ or coronavirus or CRI or cross infect\$ or disease\$ or droplet\$ or (emerg\$ adj2 pathogen\$) or epidemic\$ or flu or H1N1 or haemophilus or "health care acquired" or "health care associated" or "healthcare acquired" or "healthcare associated" or "hospital acquired" or "hospital associated" or HiB or ILI or illness\$ or incidence or infect\$ or influenza\$ or measles or MERS or metapneumovirus\$ or "Middle East respiratory syndrome" or nosocomial or orthomyxoviridae or outbreak\$ or pandemic\$ or parainfluenza or paramyxoviridae or particle\$ or pathogen\$ or pneumonia\$ or (respiratory adj2 disease\$) or (respiratory adj2 illness\$) or (respiratory adj2 infection\$) or "respiratory hygiene" or ("respiratory syncytial" adj1 virus\$) or "respiratory tract" or rhinovirus or RSV or SARS or "severe acute respiratory syndrome" or sick\$ or syncytial or transmission or varicella or viral or virion\$ or virus\$ or pertussis or "whooping cough").ti,ab,kw.
6	4 or 5
7	filtration/ or occupational exposure/ or exposure/ or exp microbial viability/
8	("face seal" or faceseal or face-seal or filter\$ or filtrat\$ or leak\$ or penetrat\$ or "viral viability" or "viral culture" or "bacterial culture" or WPF or APF or SWPF or "protection factor" or "5th percentile" or "bacteria\$ viability" or "virus viability" or "virus culture").ti,ab,kw.
9	7 or 8
10	exp health care personnel/
11	(doctor\$ or physician\$ or clinician\$ or nurse\$ or nursing or paramedic\$ or ((health\$ or hospital\$ or nurs\$ or clinical or care or medical\$) adj2 (practitioner\$ or staff or personnel or worker\$ or employee\$ or provider\$ or professional\$)) or HCW or HCP).ti,ab,kw.
12	10 or 11
13	simulation/ or exp nebulizer/
14	("breathing simulator" or "cascade impaction" or (air adj sampler\$) or "head form\$" or headform\$ or "head-form\$" or airtight or chamber\$1 or hood\$1 or man?equin\$ or man?ikin\$ or nebulizer\$ or simulat\$ or surrogate\$ or human\$ or volunteer\$ or subject\$).ti,ab,kw.
15	13 or 14
16	3 and (6 or 9) and (12 or 15)
17	limit 16 to english language
18	limit 17 to yr="1990 -Current"
19	limit 18 to exclude medline journals

**S3 Table. Database of Abstracts of Reviews of Effects (DARE)**

#	Query
S1	masks OR mask OR facemask* OR respirator OR respirators OR "n95" OR "ffp2" OR "personal protection equipment" OR "personal protective equipment"
S2	particle* or "particulate matter" or aerosol* or bioaerosol* or (acute N2 respiratory) or adenovirus* or airborne* or ARI or bacteri* or chickenpox or "chicken pox" or communicable* or coronavirus or CRI or cross infect* or disease* or droplet* or (emerg* N2 pathogen*) or epidemic* or flu or H1N1 or haemophilus or "health care acquired" or "health care associated" or "healthcare acquired" or "healthcare associated" or "hospital acquired" or "hospital associated" or HiB or ILI or illness* or incidence or infect* or influenza* or measles or MERS or metapneumovirus* or "Middle East respiratory syndrome" or nosocomial or orthomyxoviridae or outbreak* or pandemic* or parainfluenza or paramyxoviridae or particle* or pathogen* or pneumonia* or (respiratory N2 disease*) or (respiratory N2 illness*) or (respiratory N2 infection*) or "respiratory hygiene" or ("respiratory syncytial" N1 virus*) or "respiratory tract" or rhinovirus or RSV or SARS or "severe acute respiratory syndrome" or sick* or syncytial or transmission or varicella or viral or virion* or virus* or pertussis or "whooping cough"
S3	"face seal" or faceseal or face-seal or filter* or filtrat* or leak* or penetrat* or "viral viability" or "viral culture" or "bacterial culture" or WPF or APF or SWPF or "protection factor" or "5th percentile" or "bacteria* viability" or "virus viability" or "virus culture"
S4	doctor* or physician* or clinician* or nurse* or nursing or paramedic* or ((health* or hospital* or nurs* or clinical or care or medical*) N2 (practitioner* or staff or personnel or worker* or employee* or provider* or professional*)) or HCW or HCP
S5	"breathing simulator" or "cascade impaction" or (air N3 sampler*) or "head form*" or headform* or "head-form*" or airtight or chamber* or hood* or man#equin* or man#ikin* or nebulizer* or simulat* or surrogate* or human* or volunteer* or subject*
S6	S1 AND (S2 OR S3) AND (S4 OR S5)

**S4 Table. Cochrane Central Register of Controlled Trials (CENTRAL)**

#	Query
S1	masks OR mask OR facemask* OR respirator OR respirators OR "n95" OR "ffp2" OR "personal protection equipment" OR "personal protective equipment"
S2	particle* or "particulate matter" or aerosol* or bioaerosol* or (acute N2 respiratory) or adenovirus* or airborne* or ARI or bacteri* or chickenpox or "chicken pox" or communicable* or coronavirus or CRI or cross infect* or disease* or droplet* or (emerg* N2 pathogen*) or epidemic* or flu or H1N1 or haemophilus or "health care acquired" or "health care associated" or "healthcare acquired" or "healthcare associated" or "hospital acquired" or "hospital associated" or HiB or ILI or illness* or incidence or infect* or influenza* or measles or MERS or metapneumovirus* or "Middle East respiratory syndrome" or nosocomial or orthomyxoviridae or outbreak* or pandemic* or parainfluenza or paramyxoviridae or particle* or pathogen* or pneumonia* or (respiratory N2 disease*) or (respiratory N2 illness*) or (respiratory N2 infection*) or "respiratory hygiene" or ("respiratory syncytial" N1 virus*) or "respiratory tract" or rhinovirus or RSV or SARS or "severe acute respiratory syndrome" or sick* or syncytial or transmission or varicella or viral or virion* or virus* or pertussis or "whooping cough"
S3	"face seal" or faceseal or face-seal or filter* or filtrat* or leak* or penetrat* or "viral viability" or "viral culture" or "bacterial culture" or WPF or APF or SWPF or "protection factor" or "5th percentile" or "bacteria* viability" or "virus viability" or "virus culture"
S4	doctor* or physician* or clinician* or nurse* or nursing or paramedic* or ((health* or hospital* or nurs* or clinical or care or medical*) N2 (practitioner* or staff or personnel or worker* or employee* or provider* or professional*)) or HCW or HCP
S5	"breathing simulator" or "cascade impaction" or (air N3 sampler*) or "head form*" or headform* or "head-form*" or airtight or chamber* or hood* or man#equin* or man#ikin* or nebulizer* or simulat* or surrogate* or human* or volunteer* or subject*
S6	S1 AND (S2 OR S3) AND (S4 OR S5)

**S5 Table. Cochrane Database of Systematic Reviews (CDSR)**

#	Query
S1	masks OR mask OR facemask* OR respirator OR respirators OR "n95" OR "ffp2" OR "personal protection equipment" OR "personal protective equipment"
S2	particle* or "particulate matter" or aerosol* or bioaerosol* or (acute N2 respiratory) or adenovirus* or airborne* or ARI or bacteri* or chickenpox or "chicken pox" or communicable* or coronavirus or CRI or cross infect* or disease* or droplet* or (emerg* N2 pathogen*) or epidemic* or flu or H1N1 or haemophilus or "health care acquired" or "health care associated" or "healthcare acquired" or "healthcare associated" or "hospital acquired" or "hospital associated" or HiB or ILI or illness* or incidence or infect* or influenza* or measles or MERS or metapneumovirus* or "Middle East respiratory syndrome" or nosocomial or orthomyxoviridae or outbreak* or pandemic* or parainfluenza or paramyxoviridae or particle* or pathogen* or pneumonia* or (respiratory N2 disease*) or (respiratory N2 illness*) or (respiratory N2 infection*) or "respiratory hygiene" or ("respiratory syncytial" N1 virus*) or "respiratory tract" or rhinovirus or RSV or SARS or "severe acute respiratory syndrome" or sick* or syncytial or transmission or varicella or viral or virion* or virus* or pertussis or "whooping cough"
S3	"face seal" or faceseal or face-seal or filter* or filtrat* or leak* or penetrat* or "viral viability" or "viral culture" or "bacterial culture" or WPF or APF or SWPF or "protection factor" or "5th percentile" or "bacteria* viability" or "virus viability" or "virus culture"
S4	doctor* or physician* or clinician* or nurse* or nursing or paramedic* or ((health* or hospital* or nurs* or clinical or care or medical*) N2 (practitioner* or staff or personnel or worker* or employee* or provider* or professional*)) or HCW or HCP
S5	"breathing simulator" or "cascade impaction" or (air N3 sampler*) or "head form*" or headform* or "head-form*" or airtight or chamber* or hood* or man#equin* or man#ikin* or nebulizer* or simulat* or surrogate* or human* or volunteer* or subject*
S6	S1 AND (S2 OR S3) AND (S4 OR S5)

**S6 Table. Health Technology Assessment (HTA)**

#	Query
S1	masks OR mask OR facemask* OR respirator OR respirators OR "n95" OR "ffp2" OR "personal protection equipment" OR "personal protective equipment"
S2	particle* or "particulate matter" or aerosol* or bioaerosol* or (acute N2 respiratory) or adenovirus* or airborne* or ARI or bacteri* or chickenpox or "chicken pox" or communicable* or coronavirus or CRI or cross infect* or disease* or droplet* or (emerg* N2 pathogen*) or epidemic* or flu or H1N1 or haemophilus or "health care acquired" or "health care associated" or "healthcare acquired" or "healthcare associated" or "hospital acquired" or "hospital associated" or HiB or ILI or illness* or incidence or infect* or influenza* or measles or MERS or metapneumovirus* or "Middle East respiratory syndrome" or nosocomial or orthomyxoviridae or outbreak* or pandemic* or parainfluenza or paramyxoviridae or particle* or pathogen* or pneumonia* or (respiratory N2 disease*) or (respiratory N2 illness*) or (respiratory N2 infection*) or "respiratory hygiene" or ("respiratory syncytial" N1 virus*) or "respiratory tract" or rhinovirus or RSV or SARS or "severe acute respiratory syndrome" or sick* or syncytial or transmission or varicella or viral or virion* or virus* or pertussis or "whooping cough"
S3	"face seal" or faceseal or face-seal or filter* or filtrat* or leak* or penetrat* or "viral viability" or "viral culture" or "bacterial culture" or WPF or APF or SWPF or "protection factor" or "5th percentile" or "bacteria* viability" or "virus viability" or "virus culture"
S4	doctor* or physician* or clinician* or nurse* or nursing or paramedic* or ((health* or hospital* or nurs* or clinical or care or medical*) N2 (practitioner* or staff or personnel or worker* or employee* or provider* or professional*)) or HCW or HCP
S5	"breathing simulator" or "cascade impaction" or (air N3 sampler*) or "head form*" or headform* or "head-form*" or airtight or chamber* or hood* or man#equin* or man#ikin* or nebulizer* or simulat* or surrogate* or human* or volunteer* or subject*
S6	S1 AND (S2 OR S3) AND (S4 OR S5)

**S7 Table. Collective Index of Nursing and Allied Health Literature (CINAHL)**

#	Query	Limiters/Expanders
S1	(MH "Masks") OR (MH "Protective Devices") OR (MH "Respiratory Protective Devices")	Search modes - Boolean/Phrase
S2	masks OR mask OR facemask* OR respirator OR respirators OR "n95" OR "ffp2" OR "personal protection equipment" OR "personal protective equipment"	Search modes - Boolean/Phrase
S3	S1 OR S2	Search modes - Boolean/Phrase
S4	(MH "Aerosols") OR (MH "Particle Size") OR (MH "Particulate Matter") OR (MH "Bacteria") OR (MH "Bacterial Infections") OR (MH "Bordetella Pertussis") OR (MH "Whooping Cough") OR (MH "Chickenpox") OR (MH "Communicable Diseases") OR (MH "Coronavirus") OR (MH "Coronavirus Infections") OR (MH "SARS Virus") OR (MH "Cross Infection+") OR (MH "Disease Outbreaks") OR (MH "Disease Transmission+") OR (MH "Haemophilus Influenzae") OR (MH "Orthomyxoviridae+") OR (MH "Pneumonia, Bacterial+") OR (MH "Respiratory Tract Infections+") OR (MH "Respiratory Syncytial Virus Infections") OR (MH "Respiratory Syncytial Viruses") OR (MH "Gram-Negative Bacterial Infections") OR (MH "Infection") OR (MH "Infection Control") OR (MH "Influenza, Human") OR (MH "Paramyxovirus Infections+") OR (MH "Paramyxoviruses+") OR (MH "Pneumonia, Viral") OR (MH "Pneumonia") OR (MH "Respiratory Tract Diseases") OR (MH "Severe Acute Respiratory Syndrome") OR (MH "Virus Diseases") OR (MH "Viruses") OR (MH "DNA Viruses") OR (MH "Herpesviruses") OR (MH "RNA Viruses+")	Search modes - Boolean/Phrase
S5	particle* or "particulate matter" or aerosol* or bioaerosol* or (acute N2 respiratory) or adenovirus* or airborne* or ARI or bacteri* or chickenpox or "chicken pox" or communicable* or coronavirus or CRI or cross infect* or disease* or droplet* or (emerg* N2 pathogen*) or epidemic* or flu or H1N1 or haemophilus or "health care acquired" or "health care associated" or "healthcare acquired" or "healthcare associated" or "hospital acquired" or "hospital associated" or HiB or ILI or illness* or incidence or infect* or influenza* or measles or MERS or metapneumovirus* or "Middle East respiratory syndrome" or nosocomial or orthomyxoviridae or outbreak* or pandemic* or parainfluenza or paramyxoviridae or particle* or pathogen* or pneumonia* or (respiratory N2 disease*) or (respiratory N2 illness*) or (respiratory N2 infection*) or "respiratory hygiene" or ("respiratory syncytial" N1 virus*) or "respiratory tract" or rhinovirus or RSV or SARS or "severe acute respiratory syndrome" or sick* or syncytial or transmission or varicella or viral or virion* or virus* or pertussis or "whooping cough"	Search modes - Boolean/Phrase
S6	S4 OR S5	Search modes - Boolean/Phrase
S7	(MH "Filtration") OR (MH "Occupational Exposure") OR (MH "Inhalation Exposure") OR (MH "Microbiologic Phenomena")	Search modes - Boolean/Phrase
S8	"face seal" or faceseal or face-seal or filter* or filtrat* or leak* or penetrat* or "viral viability" or "viral culture" or "bacterial culture" or WPF or APF or SWPF or "protection factor" or "5th percentile" or "bacteria* viability" or "virus viability" or "virus culture"	Search modes - Boolean/Phrase

#	Query	Limiters/Expanders
S9	S7 OR S8	Search modes - Boolean/Phrase
S10	(MH "Health Personnel+")	Search modes - Boolean/Phrase
S11	doctor* or physician* or clinician* or nurse* or nursing or paramedic* or ((health* or hospital* or nurs* or clinical or care or medical*) N2 (practitioner* or staff or personnel or worker* or employee* or provider* or professional*)) or HCW or HCP	Search modes - Boolean/Phrase
S12	S10 OR S11	Search modes - Boolean/Phrase
S13	(MH "Models, Anatomic") OR (MH "Nebulizers and Vaporizers")	Search modes - Boolean/Phrase
S14	"breathing simulator" or "cascade impaction" or (air N3 sampler*) or "head form*" or headform* or "head-form*" or airtight or chamber* or hood* or man#equin* or man#ikin* or nebulizer* or simulat* or surrogate* or human* or volunteer* or subject*	Search modes - Boolean/Phrase
S15	S13 OR S14	Search modes - Boolean/Phrase
S16	S3 AND (S6 OR S9) AND (S12 OR S15)	Search modes - Boolean/Phrase
S17	S3 AND (S6 OR S9) AND (S12 OR S15)	Limiters - English Language Search modes - Boolean/Phrase
S18	S3 AND (S6 OR S9) AND (S12 OR S15)	Limiters - Published Date: 19900101-20141231; English Language Search modes - Boolean/Phrase
S19	S3 AND (S6 OR S9) AND (S12 OR S15)	Limiters - Published Date: 19900101-20141231; English Language; Exclude MEDLINE records Search modes - Boolean/Phrase

**S8 Table. PsycINFO**

#	Searches
1	exp Respiration/ and (exp Safety Devices/ or exp Safety/)
2	(masks or mask or facemask\$ or respirator or respirators or N95 or FFP2 or "personal protection equipment" or "personal protective equipment").ti,ab,id.
3	1 or 2
4	exp viral disorders/ or exp infectious disorders/ or exp pneumonia/ or exp bacterial disorders/ or epidemics/ or pandemics/ or disease transmission/ or influenza/ or respiratory tract disorders/
5	(particle\$ or "particulate matter" or aerosol\$ or bioaerosol\$ or (acute adj2 respiratory) or adenovirus\$ or airborne\$ or ARI or bacteri\$ or chickenpox or "chicken pox" or communicable\$ or coronavirus or CRI or cross infect\$ or disease\$ or droplet\$ or (emerg\$ adj2 pathogen\$) or epidemic\$ or flu or H1N1 or haemophilus or "health care acquired" or "health care associated" or "healthcare acquired" or "healthcare associated" or "hospital acquired" or "hospital associated" or HiB or ILI or illness\$ or incidence or infect\$ or influenza\$ or measles or MERS or metapneumovirus\$ or "Middle East respiratory syndrome" or nosocomial or orthomyxoviridae or outbreak\$ or pandemic\$ or parainfluenza or paramyxoviridae or particle\$ or pathogen\$ or pneumonia\$ or (respiratory adj2 disease\$) or (respiratory adj2 illness\$) or (respiratory adj2 infection\$) or "respiratory hygiene" or ("respiratory syncytial" adj1 virus\$) or "respiratory tract" or rhinovirus or RSV or SARS or "severe acute respiratory syndrome" or sick\$ or syncytial or transmission or varicella or viral or virion\$ or virus\$ or pertussis or "whooping cough").ti,ab,id.
6	4 or 5
7	exp occupational exposure/
8	("face seal" or face seal or face-seal or filter\$ or filtrat\$ or leak\$ or penetrat\$ or "viral viability" or "viral culture" or "bacterial culture" or WPF or APF or SWPF or "protection factor" or "5th percentile" or "bacteria\$ viability" or "virus viability" or "virus culture").ti,ab,id.
9	7 or 8
10	exp health personnel/
11	(doctor\$ or physician\$ or clinician\$ or nurse\$ or nursing or paramedic\$ or ((health\$ or hospital\$ or nurs\$ or clinical or care or medical\$) adj2 (practitioner\$ or staff or personnel or worker\$ or employee\$ or provider\$ or professional\$)) or HCW or HCP).ti,ab,id.
12	10 or 11
13	exp simulation/
14	("breathing simulator" or "cascade impaction" or (air adj sampler\$) or "head form\$" or headform\$ or "head-form\$" or airtight or chamber\$1 or hood\$1 or man?equin\$ or man?ikin\$ or nebulizer\$ or simulat\$ or surrogate\$ or human\$ or volunteer\$ or subject\$).ti,ab,id.
15	13 or 14
16	3 and (6 or 9) and (12 or 15)
17	limit 16 to english language
18	limit 17 to yr="1990 -Current"



S9 Table. SCOPUS

#	Query
1	<p>((((TITLE(masks OR mask OR facemask* OR respirator OR respirators OR n95 OR ffp2 OR "personal protection equipment" OR "personal protective equipment") OR KEY(masks OR mask OR facemask* OR respirator OR respirators OR n95 OR ffp2 OR "personal protection equipment" OR "personal protective equipment")) AND ((TITLE-ABS-KEY(particle* OR "particulate matter" OR aerosol* OR bioaerosol* OR (acute W/1 respiratory) OR adenovirus* OR airborne* OR ari OR bacteri* OR chickenpox OR "chicken pox" OR communicable* OR coronavirus OR cri OR "cross infect*" OR disease* OR droplet* OR (emerg* W/1 pathogen*) OR epidemic* OR flu OR h1n1 OR haemophilus OR "health care acquired" OR "health care associated" OR "healthcare acquired" OR "healthcare associated" OR "hospital acquired" OR "hospital associated" OR hib OR ili OR illness* OR incidence OR infect* OR influenza* OR measles OR mers OR metapneumovirus* OR "Middle East respiratory syndrome" OR nosocomial OR orthomyxoviridae OR outbreak* OR pandemic* OR parainfluenza OR paramyxoviridae OR particle* OR pathogen* OR pneumonia* OR (respiratory W/1 disease*) OR (respiratory W/1 illness*) OR (respiratory W/1 infection*) OR "respiratory hygiene" OR ("respiratory syncytial" W/0 virus*) OR "respiratory tract" OR rhinovirus OR rsv OR sars OR "severe acute respiratory syndrome" OR sick* OR syncytial OR transmission OR varicella OR viral OR virion* OR virus* OR pertussis OR "whooping cough")) OR (TITLE-ABS-KEY("face seal" OR face seal OR {face-seal} OR filter* OR filtrat* OR leak* OR penetrat* OR "viral viability" OR "viral culture" OR "bacterial culture" OR wpf OR apf OR swpf OR "protection factor" OR "5th percentile" OR "bacteria* viability" OR "virus viability" OR "virus culture")) AND ((TITLE-ABS-KEY(doctor* OR physician* OR clinician* OR nurse* OR nursing OR paramedic* OR ((health* OR hospital* OR nurs* OR clinical OR care OR medical*) W/2 (practitioner* OR staff OR personnel OR worker* OR employee* OR provider* OR professional*)) OR hcw OR hcp)) OR (TITLE-ABS-KEY("breathing simulator" OR "cascade impaction" OR "air sampler*" OR "head form*" OR headform* OR "head-form*" OR airtight OR chamber* OR hood* OR man*equin* OR man*ikin* OR nebulizer* OR simulat* OR surrogate* OR human* OR volunteer* OR subject*)) AND PUBYEAR &gt; 1989 AND NOT TITLE-ABS-KEY("laryngeal mask*" OR "metal mask*" OR "binary mask*" OR "ratio mask*" OR "lithography mask*" OR "oxygen mask*" OR "oxygen therap*" OR "mask coefficient*" OR "miR mask*")) AND NOT TITLE-ABS-KEY("laryngeal mask*" OR "metal mask*" OR "binary mask*" OR "ratio mask*" OR "lithography mask*" OR "phase mask*" OR "oxygen mask*" OR "oxygen therap*" OR "mask coefficient*" OR "miR mask*" OR "wire mask*" OR anesthesia OR anesthetic OR analgesic OR sedation OR intubation OR extubation OR oxygenation OR "non-invasive ventilation" OR "noninvasive ventilation" OR "mask-like fac*" OR lithography OR (ultraviolet W/1 mask*) OR "radiation mask*" OR "stencil mask*" OR "mask blank*" OR "Laws' Mask*" OR "Law's Mask*" OR "gel mask*" OR imaging OR "spectrum emission mask*" OR "cloud mask*" OR resuscitat* OR "auditory mask*" OR "time-frequency mask*")) AND (LIMIT-TO(LANGUAGE, "English"))</p>

**S10 Table. Conference abstracts searched**

Conference Title	Year of Conference Assessed	Year of Conference Unavailable
American Industrial Hygiene Conference and Exposition (AIHce)	2011, 2012, 2013	2009, 2010
American Society for Healthcare Risk Management (ASHRM) Annual Conference and Exhibition	None	2009, 2010, 2011, 2012, 2013
International Congress of the Asia Pacific Society of Infection Control (APSIC)	None	2009, 2011, 2013
Association for Professionals in Infection Control and Epidemiology (APIC) Annual Conference	2009, 2010, 2011, 2012, 2013	
Association of Medical Microbiology and Infectious Disease Canada (AMMI) – Canadian Association for Clinical Microbiology and Infectious Diseases (CACMID) Annual Conference	2009, 2010, 2011, 2012, 2013	
Australasian College for Infection Prevention and Control (ACIPC) Annual Conference	None	2012, 2013
Australasian Society for Infectious Diseases (ASID) Annual Scientific Meeting	None	2009-2013
The Australian Society for Microbiology Annual Scientific Meeting	None	2009-2013
American Society for Microbiology (ASM) Biodefense and Emerging Diseases	2009, 2010, 2011, 2012, 2013, 2014	
American Society for Microbiology (ASM) General Meeting	2009, 2010, 2011, 2012, 2013, 2014	
American Thoracic Society (ATS) Conference	2009, 2010, 2011, 2012, 2013, 2014	
Congress of the European Rhinologic Society (ERS)	None	2010 and 2012
European Congress of Clinical Microbiology and Infectious Diseases (ECCMID)	2009, 2010, 2011, 2012, 2013, 2014	
Healthcare Infection Society (HIS) International Conference	2010, 2012	
Hong Kong Infection Control Nurses' Association (HKICNA) International Infection Control Conference		2010 and 2012
Infectious Diseases Society of America (IDSA) Annual Meeting	2009, 2010, 2011, 2012, 2013, 2014	
Infection Prevention and Control (IPAC) Canada National Education Conference (formerly CHICA)	2009, 2010, 2011, 2012, 2013	
Infection Prevention Society (IPS) Annual Conference	None	2009, 2010, 2011, 2012, 2013
International Conference on Prevention and Infection Control (ICPIC)	2011, 2013	
International Congress on Infectious Diseases (ICID)	2010, 2012, 2014	
Congress of the International Federation of Infection Control (IFIC)	2009, 2010, 2011, 2012, 2014	2013
International Meeting on Emerging Diseases and Surveillance (IMED)	2009, 2011, 2013	

International Union of Microbiological Societies (IUMS) Congresses (Bacteriology, Virology and Mycology)	None	2011
Society for Healthcare Epidemiology of America (SHEA) Annual Meeting	2010, 2011, 2012, 2013, 2014	2009

S11 Table. Summary of authors contacted and unpublished data

Reference (RCT)	Corresponding author	Information required	Data obtained/unattained and reason
Loeb 2009 <sup>7</sup>	Dr. Mark Loeb	<ol style="list-style-type: none"> <li>1. There are 50 and 48 laboratory-confirmed influenza infections reported in Table 2. Is it correct to subtract 6 and 4 RT-PCR confirmed influenza infections from the former values, respectively, to obtain the number of unvaccinated health care workers with &gt;4-fold rise in serum titers (44/147 and 44/147)?</li> <li>2. Is it correct to add total 'other respiratory viruses' (20 and 22) in Table 3 to the RT-PCR influenza A (5 and 1) and B (1 and 3) values in Table 2 to obtain the number of health care workers with at least 1 respiratory virus detected by PCR (26/212 and 26/210)? I do not want to incur double counts.</li> </ol>	Response of 'Yes' to both questions
MacIntyre 2013 <sup>8</sup>	Dr. Chandini Raina MacIntyre	<ol style="list-style-type: none"> <li>1. Can you confirm which trial arm contained the B. pertussis infection? Was the infection concomitant with a viral infection?</li> </ol>	Declined to provide information
MacIntyre 2014 <sup>9</sup>	Dr. Chandini Raina MacIntyre	<ol style="list-style-type: none"> <li>1. Can you confirm which trial arm(s) contained the three B. pertussis infections? Were any of the B. pertussis infections concomitant with a viral infection?</li> </ol>	<p>Declined to provide information</p> <p>Update: The three B. pertussis infections were an error according to corrigendum. These infections are type B influenza.</p>
Reference (case-control)	Corresponding author	Information required	Data obtained/unattained and reason
Lau 2004 <sup>10</sup>	Dr. Joseph T.F. Lau	<ol style="list-style-type: none"> <li>1. Table 2: Do you have the following data? <ol style="list-style-type: none"> <li>a. # of controls who <i>only</i> wore surgical masks and contact with SARS patient</li> <li>b. # of controls who <i>only</i> wore N95 respirators and contact with SARS patient</li> <li>c. # of case-patients who <i>only</i> wore surgical masks and contact with SARS</li> </ol> </li> </ol>	<p>No response received</p> <p>Study excluded</p>

		<p>patient</p> <p>d. # of case-patients who <i>only</i> wore N95 respirators and contact with SARS patient</p>	
Liu 2009 <sup>11</sup>	Dr. Wu-Chun Cao	<ol style="list-style-type: none"> <li>1. Are the 'disposable masks' in your study disposable surgical masks?</li> <li>2. Are the N95 respirators filtering facepiece respirators?</li> </ol>	<p>No response received</p> <p>Study excluded</p>
<b>Reference (surrogate exposure study)</b>	<b>Corresponding author</b>	<b>Information required</b>	<b>Data obtained/unattained and reason</b>
Balazy 2006 <sup>12</sup>	Dr. Sergey A. Grinshpun	<ol style="list-style-type: none"> <li>1. Do you have the mean filter penetration values for the 85 L/min flow rates in Figure 4, Figure 5, Figure 6, and Figure 7, for each respirator and mask?</li> </ol>	<p>Data was not available</p> <p>Minimum efficiency estimated from graph</p>
Davidson 2013 <sup>13</sup>	Dr. Shawn G. Gibbs	<ol style="list-style-type: none"> <li>1. For Figure 3, do you have the mean efficiency values of each surgical mask and respirator for 1-3 µm PSL data?</li> </ol>	<p>Data was not available</p> <p>Minimum efficiency estimated from graph</p>
Grinshpun 2009 <sup>14</sup>	Dr. Sergey A. Grinshpun	<ol style="list-style-type: none"> <li>1. Do you have the overall mean values for filter medium penetration and face-seal leakage for the N95 respirator and surgical mask from Figure 4?</li> </ol>	<p>Data was not available</p> <p>Minimum efficiency estimated from graph</p>
He 2013 <sup>15</sup>	Dr. Sergey A. Grinshpun	<ol style="list-style-type: none"> <li>1. For Figure 1 and Figure 3, do you have the overall mean filter medium penetration values for 85 L/min at 30 breaths/min?</li> <li>2. Do you have the overall mean total inward leakage values for Figure 2 and Figure 4 for 15 L/min at 30 breaths/min?</li> </ol>	<p>Data was not available</p> <p>Minimum efficiency estimated from graph</p>
He 2014 <sup>16</sup>	Dr. Sergey A. Grinshpun	<ol style="list-style-type: none"> <li>1. For Table IV (4), do you have the values for 'Effect of MIF on TIL' for surgical mask? The values quoted in the table are the same values as N95 Effect of MIF on TIL from Table II (2).</li> <li>2. Does this article use the same data from He et al., 2013?</li> </ol>	<p>Corrected data provided and 'No' to second question</p>
Mitakakis 2002 <sup>17</sup>	Dr. Euan R. Tovey	<ol style="list-style-type: none"> <li>1. In the figure containing "Ratio of NAS count to IOM" on the Y-axis, do you have the mean and standard deviation of the ratio of NAS count to IOM of aerosol mask while wearing powdered latex gloves, and particulate mask while</li> </ol>	<p>Data was not available</p> <p>Minimum efficiency estimated from graph</p>

		wearing powdered latex gloves?	
Qian 1998 <sup>18</sup>	Dr. Klaus Willeke	<ol style="list-style-type: none"> <li>1. Do you have the mean filtration efficiency value from Figure 1 for the surgical mask and N95 respirator at 85 L/min?</li> <li>2. In Figure 2, do you have the mean filtration efficiencies for each respirator (A, B and C) for NaCl particles?</li> <li>3. Is the data for respirator A using NaCl in Figure 2 the same as the data in Figure 1 at 85 L/min?</li> </ol>	<p>No response</p> <p>Minimum efficiency estimated from graph</p>
Zou 2014 <sup>19</sup>	Dr. Maosheng Yao	<ol style="list-style-type: none"> <li>1. Was constant or cyclic flow used in the manikin setup?</li> <li>2. Can you further define why the particles in the indoor environment were termed "bioaerosols"?</li> <li>3. Were Eap values calculated for indoor conditions at 85 L/min? If yes, what were the values for each respirator and mask? If no, can you provide the Eap values for outdoor conditions at 85 L/min (from Figure 2)?</li> <li>4. Can you provide the Epp values for indoor conditions at 12.5 L/min (from Figure 5)?</li> <li>5. Do you have the approximate most penetrating particle size for each respirator and mask for indoor Epp experiments at 12.5 L/min (from supplemental Figure S3)?</li> <li>6. Do you have the approximate most penetrating particle size for each respirator and mask for outdoor Eap experiments at 85 L/min?</li> </ol>	No response

**S12 Table. Newcastle-Ottawa Scale summary of risk of bias for cohort and case-control studies<sup>20</sup>**

<b>Study</b>	<b>Selection</b>			<b>Comparability</b>	<b>Exposure/Outcome</b>		
<b><i>Cohort</i></b>							
Loeb 2004 <sup>21</sup>	*	*	*		*	*	*
<b><i>Case-Control</i></b>							
Seto 2003 <sup>22</sup>		*	*			*	
Zhang 2013 <sup>23</sup>	*	*	*	**		*	

S13 Table. GRADE quality of evidence summary<sup>1</sup>

Quality assessment							No of patients*		Effect		Quality	Importance
No of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	N95 respirators	surgical masks	Relative (95% CI)	Absolute (95% CI)		
Laboratory-confirmed respiratory infection (follow up: mean 5 weeks; assessed with: PCR, serology, and culture.)												
3	randomized trials	serious <sup>1</sup> <sub>23</sub>	not serious	not serious	serious <sup>45</sup>	none	94/1349 (7.0%)	84/805 (10.4%)	<b>OR 0.89</b> (0.64 to 1.24)	10 fewer per 1000 (from 22 more to 35 fewer)	⊕⊕○○ LOW	CRITICAL
Laboratory-confirmed respiratory infection (Cohort) (assessed with: Case definitions and serology)												
1	observational studies	serious <sup>6</sup> <sub>7</sub>	not serious <sup>8</sup>	not serious	serious <sup>45</sup>	none	2/16 (12.5%)	1/4 (25.0%)	<b>OR 0.43</b> (0.03 to 6.41)	125 fewer per 1000 (from 240 fewer to 431 more)	⊕○○○ VERY LOW	IMPORTANT
Laboratory-confirmed respiratory infection (Case-control) (assessed with: PCR)												
2	observational studies	very serious <sup>9</sup> <sub>10</sub>	not serious	not serious	serious <sup>45</sup>	none	40 cases 302 controls		<b>OR 0.91</b> (0.25 to 3.36)	-	⊕○○○ VERY LOW	IMPORTANT



Quality assessment							No of patients*		Effect		Quality	Importance
No of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	N95 respirators	surgical masks	Relative (95% CI)	Absolute (95% CI)		
Influenza-like illness (follow up: mean 5 weeks; assessed with: report of symptoms)												
3	randomized trials	serious <sup>1</sup> <sub>23</sub>	not serious	not serious	serious <sup>45</sup>	none	9/1349 (0.7%)	13/805 (1.6%)	<b>OR 0.51</b> (0.19 to 1.41)	8 fewer per 1000 (from 6 more to 13 fewer)	⊕⊕○○ LOW	IMPORTANT
Work-related absenteeism (follow up: mean 5 weeks; assessed with: reported time off work coinciding with illness)												
1	randomized trials	serious <sup>1</sup> <sub>23</sub>	not serious <sup>8</sup>	serious <sup>11</sup>	serious <sup>45</sup>	none	39/210 (18.6%)	42/212 (19.8%)	<b>OR 0.92</b> (0.57 to 1.5)	13 fewer per 1000 (from 72 more to 75 fewer)	⊕○○○ VERY LOW	NOT IMPORTANT

MD – mean difference, RR – relative risk

\*Cluster-adjusted effective sample sizes and event numbers

<sup>1</sup>No blinding of primary researchers, participants, or data collectors. Problematic because trigger for testing for virus is based on participants self-reporting symptoms.

<sup>2</sup>Limited or no hand hygiene audits.

<sup>3</sup>Limited direct compliance assessment

<sup>4</sup>Limited number of events and insufficient participant numbers to detect a potential difference.

<sup>5</sup>CIs cross clinical decision threshold.

<sup>6</sup>No adjustment for potential confounders.

<sup>7</sup>A subgroup of the initial cohort was used for analysis.

<sup>8</sup>Single study.

<sup>9</sup>No testing for exposure prior to study.

<sup>10</sup>No control for mask compliance.

<sup>11</sup>Indirect outcome.

**S1 Fig. Cochrane Risk of Bias Tool risk of bias summary for each included RCT<sup>7,8,9,24,25</sup>**

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Loeb 2009	+	?	-	?	+	+	+
MacIntyre 2011/2014	+	?	-	-	+	+	+
MacIntyre 2013	+	?	-	-	+	+	+

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