Infection Prevention and Control Expert Group (ICEG)

Please update current list on [Infection Prevention and Control Expert Group (ICEG) | Australian Government Department of Health](#) **with the details provided below:**

MEMBER	BACKGROUND AND EXPERIENCE
Professor Alison McMillan PSM – Chair	RN, Critical Care Nursing Cert, BEd, MBA • Chief Nursing and Midwifery Officer, Department of Health.
Ms Belinda Henderson – Deputy Chair	RN, BN, IPN, MAdvanced Prac (Infection control), CICP-E, FACIPC • Past President, Australasian College of Infection Prevention and Control. • Infection control advisor, COVID19 Health System Response, Department of Health, Queensland.
Associate Professor Noleen Bennett	PhD, MPH, RN • Project Coordinator, Aged Care National Antimicrobial Prescribing Survey, National Centre for Antimicrobial Stewardship • IPC consultant, Victorian Healthcare Associated Infection Surveillance System Coordinating Centre
Associate Professor John Ferguson PSM	FRACP, FRCPA, DTM&H (Liverpool) • Director, Infection Prevention Service, Hunter New England Health. • Infectious Disease Physician and Microbiologist, John Hunter Hospital, Newcastle. • Conjoint Associate Professor, University of Newcastle.
Associate Professor Andrew Stewardson	MBBS MS(Epi) PhD FRACP • Infectious Diseases Physician, Department of Infectious Diseases, The Alfred Hospital and Monash University. • Chair, Healthcare Infection Control Special Interest Group, Australasian Society for Infectious Diseases.
Dr Gary Lum AM	BMedSc MBBS FRCPA, FACTM, FASM • Principal Medical Advisor, Chief Medical Officer Group. • Honorary VMO, ACT Pathology. • Honorary Professor, Medical School, Australian National University.
Ms Kathy Dempsey	RN, DippApSc, BSc (Nursing), MNSc (Infection Control & Hospital Epidemiology); SHEA/CDC Cert Infection Control, Cert Med Micro, DipLdrshp&Mgt.CICP-E, Future Leaders of Healthcare DrPH Candidate • NSW Chief ICP & HAI Advisor, IPAC COVID-19 Response Clinical Lead, Clinical Excellence Commission. • Infection Prevention and Control Practitioner (CICPE). • Board Director, Australasian College of Infection Prevention and Control.
Ms Rebecca McCann	RN BSc, Cert IP&C Cert IV Training and Education • Manager, Infection Prevention, Policy and Surveillance Unit, Communicable Disease Control Directorate, Public and Aboriginal Health Division, Department of Health Western Australia.
Professor Malcolm Sim AM	BMedSc, MBBS, MSc (Lond), GDipOccHyg, PhD, FAFOEM (RACP), FAFPHM (RACP), FFOM (RCP) • Director, Centre for Occupational and Environmental Health, School of Public Health and Preventive Medicine, Monash University. • President, Australasian Faculty of Occupational and Environmental Medicine, Royal Australasian College of Physicians.
Professor Peter Collignon AM	MBBS, BSc (Med), PhD, FRACP, FRCPA, FASM • Chair – Healthcare Associated Infection (HAI) Advisory Committee for Australian Commission on Safety and Quality in Health Care. • Infectious Diseases Physician & Microbiologist, ACT Pathology, Canberra Hospital. • Professor, ANU Medical School.
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Ms Samantha Butenko	RN, GCNS Inf Ctrl, Dip Mgt, CICP-E, MClinSc. • Nursing Director, COVID Operations Infection Control Service, COVID Operations Health Regulation and Protection, Department for Health and Wellbeing, Government of South Australia
The Australian Commission on Safety and Quality in Health Care (The Commission) representatives:	Dr Jan Gralton - BSc (Hons), PhD, GradCert HealthPol Senior Advisor, IPC, and Healthcare Associated Infections.
	Adjunct Professor Kathy Meleady - BSc, Grad Dip FDA, MBA, GAICD

	Stream Director, ACSQHC AURA IPC, Healthcare Associated Infections, Emerging Issues.
	Conjoint Professor Anne Duggan - BA (Hons), Dip Ed, B. Med, MHP, FRACP, FRACMA, GAICD Conjoint Professor, University of Newcastle. Clinical Director, The Commission.

MEMBER	BACKGROUND AND EXPERIENCE	FOR MEMBER ADVICE 1. Are you committed to staying through to end of current workplan (approx. Jan 2023)? 2. Please check your background and experience details to enable a web update. 3. Do you think there any potential gaps in representation?

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Rapid reviews of SARS-CoV-2 topics for infection prevention and control guidance development:

Executive summary and methods

Prepared for the Infection Control Expert Group (ICEG) under the Deed of Standing Offer for research, evaluation and data services (Deed number 60002733) between The Australian Government Department of Health and Monash University

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Conflict of interest declaration
The authors declare no conflict of interest.

Disclaimers
Provision of specific recommendations based on the review findings is beyond the scope of the works presented in this report and accompanying materials, being the responsibility of the Infection Control Expert Group (ICEG) and the Australian Health Protection Principal Committee (AHPPC). Instead, our approach involves engagement with representatives of these and related bodies in question development to ensure that the review question best meets their needs. We therefore request that members of this research team are not attributed to any recommendations that draw upon the reviews undertaken. This is in addition to the standard and approved legal disclaimer used on all reviews which is reproduced below.

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Executive summary

Background

Although many public health restrictions imposed in response to the global SARS-CoV-2 pandemic have been lifted in Australia, the pandemic continues to challenge Australians and the health systems that support them. Whilst the Omicron variant that emerged in late 2021 does not result in major illness in most cases, the transmissibility and volume of citizens affected is resulting in large numbers of infections, hospital admissions and deaths.

In this context, in early 2022 The Australian Government Department of Health sought a quotation from Monash University under the Deed of Standing Offer for research, evaluation and data services (Deed number 60002733) to produce five rapid evidence reviews to support the work of the **Infection Control Expert Group (ICEG)** in providing advice to the **Australian Health Protection Principal Committee (AHPPC)** and its other standing committees on infection prevention and control issues.

This report presents headline findings from the five reviews, and details of the search strategies used. The accompanying PDF presentations present further detail on the methods employed and the findings of each included study across the reviews. An online Mendeley library enables access to the PDF files of all included studies.

Research team and method

The reviews were undertaken between March and June 2022 by the Monash Sustainable Development Institute's Evidence Review Service (ERS) and Monash University's Infectious Diseases Epidemiology Unit at the School of Public Health and Preventive Medicine**.**

The research team used an established, evidence-based approach to meet the outlined requirements. Rapid desktop reviews are a recognised approach to distilling high-level themes from a body of literature in very short time frames (Khangura et al. 2012; Speckemeier et al. 2022). ERS researchers have been at the vanguard of these developments as reflected by both methodological (Bragge et al. 2022) and review publications (Waddell et al. 2021; Peter Bragge et al. 2021; Rowland et al. 2021). Rapid reviews utilise the same principles as systematic reviews (systematic searching, appraisal, and synthesis) with a focus on building on recent reviews and other repositories of relevant research evidence. Our review approach is also informed by that of the National COVID-19 Clinical Evidence Taskforce. Quality appraisal was undertaken using recognised tools for systematic reviews (Shea et al. 2017) and primary studies (Critical Appraisal Skills Programme 2022b; 2022a; 2022c). Overlap in coverage of primary literature across included reviews was examined using the GROOVE tool (Pérez-Bracchiglione et al. 2022).

Consistent with evolving methods of 'living' reviews and guidelines driven by the COVID-19 pandemic (Elliott and Jeppesen 2021; Bragge et al. 2022), reviews 1 – 4 were updated in late May, with any newly-identified research identified incorporated into earlier findings and added to an online library accessible to the Committee.

Key findings by review

Review 1: What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 infection in HCWs and the general population? [review of reviews] – LAST SEARCH CONDUCTED May 18, 2022.

AND

Review 5: What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 / influenza infection in HCWs and the general population? [review of primary studies] – LAST SEARCH CONDUCTED May 20, 2022

These two companion reviews presented review-level evidence (R1) and primary studies (R5) comparing the efficacy of N95 respirators and surgical masks in preventing SARS-CoV-2 (R1 and R5) and/or influenza (R5 only). R5 specifically aimed to capture primary studies that were not included in the identified systematic reviews and/or that were published after the most recent systematic review search date. Including results of update searches, thirteen systematic reviews and eight primary studies were identified. Higher-quality review evidence supported the use of N95 respirators to provide better protection for healthcare workers (HCWs) against SARS-CoV-2 compared to surgical masks. Similarly, primary studies reported that FFP2/(K)N95 masks were superior to surgical masks for reducing risk of SARS-CoV-2 transmission in healthcare workers. Surgical masks offer more protection than no mask and may be equally as effective as FFP2/(K)N95 masks in protecting against influenza. There was comparatively little evidence outside of HCWs, however the general direction of findings paralleled the healthcare-based research in demonstrating that FFP2/(K)N95 appear superior to surgical masks for reducing risk of SARS-CoV-2 transmission in the general population.

Review 2: What is the comparative efficacy of using gowns and/or gloves and no gowns and/or gloves on preventing SARS-CoV-2 infection in healthcare and quarantine workers? – LAST SEARCH CONDUCTED May 27, 2022

Four systematic reviews and nine primary studies were identified. No new research was identified by the update search. All research was conducted on HCWs. One review of higher quality reported that gloves and gowns provide protection from both SARS-CoV-2 and other RNA viruses. The remaining higher quality review and the two lower quality reviews reported that gloves and gowns provide protection from other RNA viruses. Evidence was mixed across the primary studies, which all focused on SARS-CoV-2. Three studies (including one higher quality) reported that gowns protected HCWs from SARS-CoV-2 infection and 2 lower quality studies reported that gowns did not offer protection from SARS-CoV-2 infection. Similarly, of the 7 primary studies examining glove use, 4 studies, including 2 of higher quality, reported that gloves offered no protection, or *increased* risk of SARS-CoV-2 infection; 3 studies (1 higher quality) reported that gloves did offer protection.

Review 3: On what surfaces and objects, and for how long, can SARS-CoV-2 be detected? Is there evidence for human infection of SARS-CoV-2 from fomites? – LAST SEARCH CONDUCTED May 27, 2022.

Thirteen studies were identified, comprising 12 systematic reviews and 1 primary study. A further five primary studies were identified in the update search. The higher quality review evidence reported that although SARS-CoV-2 RNA is present on surfaces, there is little

evidence demonstrating recovery of viable virus. Therefore, the risk of transmission of SARS-CoV-2 through fomites is likely to be low. Similarly, the primary studies collectively reported that although SARS-CoV-2 virus can be detected on various surfaces and appears to survive for longer in colder temperatures, recovery of viable virus from fomites is uncommon and most studies conclude that the probability of transmission from surfaces to humans is low. Evidence on the surface survivability of the Omicron variant compared to earlier variants is mixed and of low-quality, therefore no conclusions on this aspect can be drawn.

Review 4: How effective are cleaning and disinfection interventions in preventing SARS-CoV-2 transmission and/or reducing SARS-CoV-2 viability or detection on surfaces? - LAST SEARCH CONDUCTED May 27, 2022

Fourteen studies were identified, comprising 9 systematic reviews and 5 primary studies. No studies were identified in the update search. Eight out of 9 reviews were lower quality, and only two were conducted in real world settings. Agents reported to be effective across the included reviews included heat, simulated sunlight, UV, sodium hypochlorite, ethanol, hydrogen peroxide, chlorine-based disinfectants and alcohol. Findings were similar in five real-world, lower quality primary studies.

Results summary by review

Review 1: What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 infection in HCWs and the general population? [review of reviews]

- **13 systematic reviews (one living with 2 updates) published in 2020 (n=5), 2021 (n=6) and 2022 (n=2).**
  - 8/13 = High quality, 5/13 = Low quality
  - All examined HCWs
  - 6/13 also examined the general population (one living with 2 updates)
- **HCWs (12 reviews):**
  - 6 reviews (6 = High quality) supported the use of N95 respirators to provide slightly better protection for HCWs against SARS-CoV-2 compared to surgical masks
  - 7 reviews (5 = Low quality, 2 = High quality) could not conclude if N95s provided better protection for HCWs against SARS-CoV-2 transmission compared to surgical masks
- **General population (6 reviews):**
  - All reviews (3 = High quality, 3 = Low quality) could not conclude if N95s provided better protection for the general public against SARS-CoV-2 transmission compared to surgical masks

Review 5: What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 / influenza infection in HCWs and the general population? [review of primary studies]

- Based on 8 primary studies not included in any of the systematic reviews from the 'review of reviews' for this question.
- **Health care workers (7 studies):**
  - 3 out of 4 higher quality studies (all cross-sectional surveys) all concluded that FFP2/(K)N95 masks were superior to surgical masks for reducing risk of SARS-CoV-2 transmission in healthcare settings
  - 1 higher quality pragmatic cluster-RCT (n=2,862) did not find a statistically significant difference in N95 vs. medical masks for influenza
  - 3 lower quality studies found surgical mask wearing significantly lower in positive vs. negative cases (n=1497, prospective cohort); FFP2 masks reduced risk of SARS-CoV-2 (n=83, cross-sectional survey); and no difference between surgical masks vs. respirators (e.g. N95 / powdered air-purifying / controlled air purifying respirator) for positive SARS-CoV-2 test in postexposure quarantine (n=345, retrospective cohort)
  - **In conclusion, FFP2/(K)N95 masks are superior to surgical masks for reducing risk of SARS-CoV-2 transmission in healthcare workers. Surgical masks offer more protection than no mask and may be equally effective in protecting against influenza.**
- **General population (2 studies)**
  - One higher quality primary study (n=1,828, case-control) found reduced of odds of SARS-CoV2 for any mask vs. none, with N95 lower odds (OR 0.17 - SIG) than surgical (0.34 - SIG) or cloth (0.44 – NS)
  - One higher quality primary study (n=3,726, cross-sectional survey) reported FFP2/(K)N95 mask-wearers were significantly less likely to report SARS-CoV-2 than those using a surgical or cloth mask)

- **In conclusion, FFP2/(K)N95 appear superior to surgical masks for reducing risk of SARS-CoV-2 transmission in the general population, however the volume of evidence compared to that in healthcare workers is low**

Review 2: What is the comparative efficacy of using gowns and/or gloves and no gowns and/or gloves on preventing SARS-CoV-2 infection in healthcare and quarantine workers?

- **All studies were on HCWs, with no studies specifically referring to the quarantine environment.**
  - 4 systematic reviews (one living) published in 2020 (n=2) and 2021 (n=2)
    - 2/4 = Low quality, 2/4 = High quality
  - 9 primary studies published in 2020 (n=4) and 2021 (n=5)
    - 6/9 = Low quality, 3/9 = High quality
- **Other RNA viruses:**
  - All reviews (2 = High quality, 2 = Low quality [one living]) reported using gowns and gloves protected HCWs from infection with other RNA viruses.
- **SARS-CoV-2:**
  - 1/4 reviews (High quality) reported using gowns and gloves protected HCWs from SARS-CoV-2 infection
  - 3/4 reviews (1 = High quality, 2 = Low quality [one living]) could not conclude if using gowns and gloves protected HCWs from SARS-CoV-2 infection

Review 3: On what surfaces and objects, and for how long, can SARS-CoV-2 viruses be detected? Is there evidence for human infection of SARS-CoV-2 from fomites?

- None of the 12 included reviews (or any identified primary study) explicitly examined human infection from fomite exposure.
- **Based on four higher-quality reviews:**
  - SARS-CoV-2 RNA can be detected on inanimate surfaces in a range of real-world settings
  - Risk of SARS-CoV-2 contamination on surfaces in real-world settings is proportional to exposure time and is therefore low in most public places and high where there is prolonged exposure to infected patients (healthcare facilities) and virus (laboratories)
  - Under laboratory conditions, viable SARS-CoV-2 can be detected for up to 28 days on glass, stainless steel, and polymer and paper banknotes. Low temperature and moisture can increase virus survival, while UV light and sunlight can substantially decrease virus survival on exposed surfaces
  - Although SARS-CoV-2 RNA is present on surfaces, there is little evidence demonstrating recovery of viable virus. Therefore, the risk of transmission of SARS-CoV-2 through fomites is low
- **Based on eight lower-quality reviews:**
  - Lower-quality reviews also report detection of virus on a range of surfaces (e.g., nitrile gloves, N95 masks, air outlets, hospital floors) in real-world settings including primary care units, hospitals, diagnostic labs, public transport systems and long-term care facilities
  - Most reviews conclude that fomite transmission is plausible but not conclusively proven as a sole or primary mode of transmission outside of mathematical models and experimental studies

- **Based on one primary study comparing environmental contamination by patients infected with different SARS-CoV-2 variants:**
    - Glinert et al. (2022) analysed 217 samples taken from 49 patients infected with the original (n=15), Alpha (n=18) and Omicron (n=12) variants. Contamination rates on high-contact surface were virtually identical for all strains. No samples contained viable virus. The study concluded that Omicron's increased transmissibility does not result from acquiring airborne infectivity, higher environmental contamination, or better resilience on surfaces

Review 4: How effective are cleaning and disinfection interventions in preventing SARS-CoV-2 transmission and/or reducing SARS-CoV-2 viability or detection on surfaces?

- **Based on one higher-quality review (<u>in vitro</u> only):**
    - Heat, simulated sunlight, and UV were found to reduce SARS-CoV-2 on surfaces
    - Sodium hypochlorite, ethanol, and hydrogen peroxide were found to reduce concentrations of potential surrogates of SARS-CoV-2 on surfaces
- **Based on eight lower-quality reviews – only <u>two covering real world</u> settings:**
    - Several chemical agents were reported to be effective against SARS-CoV-2 across multiple reviews including chlorine-based disinfectants (including sodium hypochlorite/bleach; 4 reviews) and alcohol (4 reviews)
    - Other chemical agents reported to be effective against SARS-CoV-2 included hydrogen peroxide, chlorhexidine and quaternary ammonium compounds (QACs)
    - UV technologies were reported to be effective in 5 reviews
    - Gaseous ozone was reported to be effective in 2 reviews, but was also reported to cause building damage and compromise respiratory health
- **Based on five <u>real-world</u> (hospital) lower-quality primary studies:**
    - Standard chemical decontamination (per WHO guidelines) effectively removes SARS-CoV-2 viral RNA from surfaces in a hospital environment
    - UV LED disinfection reduced but did not eliminate SARS-CoV-2 environmental contamination (although viable virus was not recovered); UV LED robot more effective in spacious areas
    - Isolation of infected patients, hand hygiene, PPE and environmental cleaning and disinfection prevented spread of SARS-CoV-2 from contaminated patient rooms to general ward areas
    - SARS-CoV-2 RNA contamination was highly prevalent following 'terminal cleaning' (QAC and chlorine-based products followed by UV-GI), although median viral load was significantly lower among high-touch and floor surfaces post-clean; contamination rose over time despite stable disinfection protocols
    - Alcohol-based hand rubs and sodium hypochlorite effectively removed SARS-CoV-2 on plastic and stainless steel, but not on wood, MDF and ceramic

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Appendix 1: Search strategies by review

Review 1: What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 infection in HCWs and the general population? [review of reviews]

Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions <1946 to May 18, 2022>

1 N95 Respirators/ 258
2 Masks/ 6664
3 Respiratory Protective Devices/ 2381
4 (respirat* adj3 (devic* or air purif*)).ti,ab. 1248
5 (filter* adj1 face$piece adj1 respirat*).ti,ab. 391
6 ((N95 or KN94 or KN95 or P2 or FFP2) adj8 (mask* or face* or face$piece* or respirat* or ffr* or airborne or droplet*)).ti,ab. 1719
7 (P2 adj N95).ti,ab. 11
8 particulate respirator*.ti,ab. 88
9 (respirat* adj3 (filtrat* or filter*)).ti,ab. 800
10 (mask or masks or face$mask* or face$piece*).ti,ab. 46918
11 ((airborne or aerosol or droplet*) adj5 (mask or masks or face$mask* or face$piece*)).ti,ab. 327
12 Inhalation Exposure/pc 592
13 or/1-12 51561
14 SARS-CoV-2/ 125004
15 SARS-CoV2.ti,ab. 2641
16 SARS Virus/ 4059
17 Severe Acute Respiratory Syndrome/ 5690
18 severe acute respirat* distress syndrom*.ti,ab. 1185
19 (SARS adj5 (virus* or syndrom*)).ti,ab. 33003
20 Middle East Respiratory Syndrome Coronavirus/ 1833
21 (MERS or middle east respirat* syndrom*).ti,ab. 7711
22 Coronavirus/ 5000
23 Coronavirus Infections/ 45451
24 Influenza, Human/ 54948
25 ((influenza* or flu or grippe*) adj5 human*).ti,ab. 8745
26 (novel coronavirus* or novel corona virus* or ncov* or covid 19 or covid-19 or covid19).ti,ab. 218038
27 COVID-19/ 160560
28 (("2019" or "19") adj1 (ncov or covid or novel)).ti,ab. 216190
29 (coronavir* or corona virus* or COVID).ti,ab. 244879
30 Betacoronavirus/ 33245
31 (betacoronavirus* or "hcov-hku1").ti,ab. 1057
32 Influenza A virus/ 22227
33 Influenzavirus A/ 273
34 Influenza A Virus, H1N1 Subtype/ 16913
35 "influenza A virus*".ti,ab. 14853
36 Influenza B virus/ 4534
37 Influenzavirus B/ 175
38 "influenza B virus*".ti,ab. 1986

39 Common Cold/ 4361
40 (common cold* or catarrh*).ti,ab. 11313
41 Rhinovirus/ 4055
42 rhinovirus*.ti,ab. 6169
43 Adenoviridae/ 28468
44 (adenovirida* or adenovirus*).ti,ab. 47346
45 H1N1.ti,ab. 18969
46 ("H1N1" adj5 (virus* or influenza*)).ti,ab. 14870
47 Respiratory Syncytial Virus, Human/ 3374
48 (respiratory syncytial virus* adj3 human*).ti,ab. 2037
49 (rsv adj3 virus*).ti,ab. 9777
50 (rsv adj3 virus* adj3 human*).ti,ab. 721
51 Parainfluenza Virus 1, Human/ 2865
52 Parainfluenza Virus 3, Human/ 1211
53 (parainfluenza virus adj3 ("1" or "3")).ti,ab. 1473
54 (parainfluenza virus* adj3 human* adj3 ("1" or "3")).ti,ab. 651
55 "variant* of concern".ti,ab. 1753
56 (VOC* adj5 virus*).ti,ab. 57
57 "variant* of interest".ti,ab. 351
58 (VOI* adj5 virus*).ti,ab. 38
59 (SARS adj5 (variant* or interest*)).ti,ab. 4496
60 ((Alpha or Beta or Delta or Gamma or Omicron) adj5 variant*).ti,ab. 11582
61 (sub?variant* or sub-variant*).ti,ab. 249
62 or/14-61 442900
63 13 and 62 7356
64 ((surgical or medical or cloth or fabric) adj3 (mask or masks or face$mask* or face$piece*)).ti,ab. 1856
65 63 and 64 1153
66 limit 65 to yr="2012 - 2022" 1092
67 limit 66 to english language 1060

Embase Classic+Embase <1947 to 2022 May 18>

1 minimally 94 percent efficient filtering facepiece respirator/ 1941
2 mask/ 8266
3 respiratory protection/ 192
4 (respirat* adj3 (devic* or air purif*)).ti,ab. 1785
5 (filter* adj1 face$piece adj1 respirat*).ti,ab. 372
6 ((N95 or KN94 or KN95 or P2 or FFP2) adj8 (mask* or face* or face$piece* or respirat* or ffr* or airborne or droplet*)).ti,ab. 1918
7 (P2 adj N95).ti,ab. 12
8 particulate respirator*.ti,ab. 96
9 (respirat* adj3 (filtrat* or filter*)).ti,ab. 905
10 (mask or masks or face$mask* or face$piece*).ti,ab. 61733
11 ((airborne or aerosol or droplet*) adj5 (mask or masks or face$mask* or face$piece*)).ti,ab. 396
12 exposure/pc 149
13 or/1-12 66919
14 Severe acute respiratory syndrome coronavirus 2/ 64062
15 SARS-CoV2.ti,ab. 4027
16 SARS coronavirus/ 7928

17 severe acute respiratory syndrome/ 10778
18 severe acute respirat* distress syndrom*.ti,ab. 1625
19 (SARS adj5 (virus* or syndrom*)).ti,ab. 33449
20 Middle East respiratory syndrome coronavirus/ 4503
21 (MERS or middle east respirat* syndrom*).ti,ab. 8423
22 Coronavirinae/ 4032
23 Coronavirus infection/ 12664
24 influenza/ 76141
25 ((influenza* or flu or grippe*) adj5 human*).ti,ab. 10166
26 (novel coronavirus* or novel corona virus* or ncov* or covid 19 or covid-19 or covid19).ti,ab. 232796
27 coronavirus disease 2019/ 214655
28 (("2019" or "19") adj1 (ncov or covid or novel)).ti,ab. 230337
29 (coronavir* or corona virus* or COVID).ti,ab. 261621
30 Betacoronavirus/ 7682
31 (betacoronavirus* or "hcov-hku1").ti,ab. 1056
32 Influenza A virus/ 5726
33 Influenzavirus A/ 40
34 "Influenza A virus (H1N1)"/ 5456
35 "influenza A virus*".ti,ab. 17125
36 Influenza B virus/ 2056
37 Influenzavirus B/ 25
38 "influenza B virus*".ti,ab. 2341
39 common cold/ 10740
40 (common cold* or catarrh*).ti,ab. 16036
41 Rhinovirus/ 7784
42 rhinovirus*.ti,ab. 9372
43 Adenoviridae/ 9337
44 (adenovirida* or adenovirus*).ti,ab. 61373
45 H1N1.ti,ab. 24180
46 ("H1N1" adj5 (virus* or influenza*)).ti,ab. 18674
47 Human respiratory syncytial virus/ 6595
48 (respiratory syncytial virus* adj3 human*).ti,ab. 2391
49 (rsv adj3 virus*).ti,ab. 12524
50 (rsv adj3 virus* adj3 human*).ti,ab. 894
51 Human parainfluenza virus 1/ 626
52 human parainfluenza virus 3/ 748
53 (parainfluenza virus adj3 ("1" or "3")).ti,ab. 1785
54 (parainfluenza virus* adj3 human* adj3 ("1" or "3")).ti,ab. 724
55 "variant* of concern".ti,ab. 1929
56 (VOC* adj5 virus*).ti,ab. 64
57 "variant* of interest".ti,ab. 556
58 (VOI* adj5 virus*).ti,ab. 39
59 (SARS adj5 (variant* or interest*)).ti,ab. 4699
60 ((Alpha or Beta or Delta or Gamma or Omicron) adj5 variant*).ti,ab. 12453
61 (sub?variant* or sub-variant*).ti,ab. 320
62 or/14-61 520370
63 13 and 62 8841
64 ((surgical or medical or cloth or fabric) adj3 (mask or masks or face$mask* or face$piece*)).ti,ab. 2131
65 63 and 64 1229

66 limit 65 to yr="2012 - 2022" 1153
67 limit 66 to english language 1124

EBM Reviews - Cochrane Central Register of Controlled Trials <April 2022>

1 N95 Respirators/ 10
2 Masks/ 546
3 Respiratory Protective Devices/ 77
4 (respirat* adj3 (devic* or air purif*)).ti,ab. 253
5 (filter* adj1 face$piece adj1 respirat*).ti,ab. 11
6 ((N95 or KN94 or KN95 or P2 or FFP2) adj8 (mask* or face* or face$piece* or respirat* or ffr* or airborne or droplet*)).ti,ab. 161
7 (P2 adj N95).ti,ab. 0
8 particulate respirator*.ti,ab. 6
9 (respirat* adj3 (filtrat* or filter*)).ti,ab. 47
10 (mask or masks or face$mask* or face$piece*).ti,ab. 9059
11 ((airborne or aerosol or droplet*) adj5 (mask or masks or face$mask* or face$piece*)).ti,ab. 39
12 Inhalation Exposure/pc 0
13 or/1-12 9376
14 SARS-CoV-2/ 916
15 SARS-CoV2.ti,ab. 314
16 SARS Virus/ 9
17 Severe Acute Respiratory Syndrome/ 366
18 severe acute respirat* distress syndrom*.ti,ab. 157
19 (SARS adj5 (virus* or syndrom*)).ti,ab. 1065
20 Middle East Respiratory Syndrome Coronavirus/ 2
21 (MERS or middle east respirat* syndrom*).ti,ab. 170
22 Coronavirus/ 4
23 Coronavirus Infections/ 669
24 Influenza, Human/ 2930
25 ((influenza* or flu or grippe*) adj5 human*).ti,ab. 302
26 (novel coronavirus* or novel corona virus* or ncov* or covid 19 or covid-19 or covid19).ti,ab. 10129
27 COVID-19/ 1681
28 (("2019" or "19") adj1 (ncov or covid or novel)).ti,ab. 9981
29 (coronavir* or corona virus* or COVID).ti,ab. 10544
30 Betacoronavirus/ 118
31 (betacoronavirus* or "hcov-hku1").ti,ab. 25
32 Influenza A virus/ 413
33 Influenzavirus A/ 6
34 Influenza A Virus, H1N1 Subtype/ 408
35 "influenza A virus*".ti,ab. 253
36 Influenza B virus/ 298
37 Influenzavirus B/ 7
38 "influenza B virus*".ti,ab. 97
39 Common Cold/ 529
40 (common cold* or catarrh*).ti,ab. 1427
41 Rhinovirus/ 148
42 rhinovirus*.ti,ab. 459
43 Adenoviridae/ 153

44 (adenovirida* or adenovirus*).ti,ab. 844
45 H1N1.ti,ab. 1332
46 ("H1N1" adj5 (virus* or influenza*)).ti,ab. 860
47 Respiratory Syncytial Virus, Human/ 74
48 (respiratory syncytial virus* adj3 human*).ti,ab. 59
49 (rsv adj3 virus*).ti,ab. 641
50 (rsv adj3 virus* adj3 human*).ti,ab. 32
51 Parainfluenza Virus 1, Human/ 5
52 Parainfluenza Virus 3, Human/ 15
53 (parainfluenza virus adj3 ("1" or "3")).ti,ab. 39
54 (parainfluenza virus* adj3 human* adj3 ("1" or "3")).ti,ab. 18
55 "variant* of concern".ti,ab. 33
56 (VOC* adj5 virus*).ti,ab. 1
57 "variant* of interest".ti,ab. 9
58 (VOI* adj5 virus*).ti,ab. 4
59 (SARS adj5 (variant* or interest*)).ti,ab. 70
60 ((Alpha or Beta or Delta or Gamma or Omicron) adj5 variant*).ti,ab. 144
61 (sub?variant* or sub-variant*).ti,ab. 3
62 or/14-61 18081
63 13 and 62 455
64 ((surgical or medical or cloth or fabric) adj3 (mask or masks or face$mask* or face$piece*)).ti,ab. 239
65 63 and 64 108
66 limit 65 to yr="2012 - 2022" 90
67 limit 66 to english language 89

Review 2: What is the comparative efficacy of using gowns and/or gloves and no gowns and/or gloves on preventing SARS-CoV-2 infection in healthcare and quarantine workers?

Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions <1946 to May 27, 2022>

1 SARS-CoV-2/ 126614
2 SARS-CoV2.ti,ab. 2666
3 SARS Virus/ 4066
4 Severe Acute Respiratory Syndrome/ 5690
5 severe acute respirat* distress syndrom*.ti,ab. 1190
6 (SARS adj5 (virus* or syndrom*)).ti,ab. 33350
7 Middle East Respiratory Syndrome Coronavirus/ 1842
8 (MERS or middle east respirat* syndrom*).ti,ab. 7734
9 Coronavirus/ 5005
10 Coronavirus Infections/ 45468
11 Influenza, Human/ 55016
12 ((influenza* or flu or grippe*) adj5 human*).ti,ab. 8757
13 (novel coronavirus* or novel corona virus* or ncov* or covid 19 or covid-19 or covid19).ti,ab. 220863
14 COVID-19/ 163317
15 (("2019" or "19") adj1 (ncov or covid or novel)).ti,ab. 219008
16 (coronavir* or corona virus* or COVID).ti,ab. 247940
17 Betacoronavirus/ 33246
18 (betacoronavirus* or "hcov-hku1").ti,ab. 1065
19 Influenza A virus/ 22247
20 Influenzavirus A/ 273
21 Influenza A Virus, H1N1 Subtype/ 16924
22 "influenza A virus*".ti,ab. 14881
23 Influenza B virus/ 4537
24 Influenzavirus B/ 175
25 "influenza B virus*".ti,ab. 1988
26 Common Cold/ 4362
27 (common cold* or catarrh*).ti,ab. 11321
28 Rhinovirus/ 4056
29 rhinovirus*.ti,ab. 6174
30 Adenoviridae/ 28476
31 (adenovirida* or adenovirus*).ti,ab. 47394
32 H1N1.ti,ab. 18989
33 ("H1N1" adj5 (virus* or influenza*)).ti,ab. 14883
34 Respiratory Syncytial Virus, Human/ 3382
35 (respiratory syncytial virus* adj3 human*).ti,ab. 2038
36 (rsv adj3 virus*).ti,ab. 9791
37 (rsv adj3 virus* adj3 human*).ti,ab. 722
38 Parainfluenza Virus 1, Human/ 2865
39 Parainfluenza Virus 3, Human/ 1211
40 (parainfluenza virus adj3 ("1" or "3")).ti,ab. 1473
41 (parainfluenza virus* adj3 human* adj3 ("1" or "3")).ti,ab. 651
42 "variant* of concern".ti,ab. 1818

43 (VOC* adj5 virus*).ti,ab. 58
44 "variant* of interest".ti,ab. 356
45 (VOI* adj5 virus*).ti,ab. 39
46 (SARS adj5 (variant* or interest*)).ti,ab. 4653
47 ((Alpha or Beta or Delta or Gamma or Omicron) adj5 variant*).ti,ab. 11760
48 (sub?variant* or sub-variant*).ti,ab. 253
49 or/1-48 446368
50 Gloves, Protective/ 2173
51 (protecti* adj3 glove*).ti,ab. 915
52 Gloves, Surgical/ 3048
53 (surgical adj3 glove*).ti,ab. 1146
54 Protective Clothing/ 6190
55 (protect* adj3 cloth*).ti,ab. 2180
56 Personal Protective Equipment/ 3688
57 (personal protective equipment* or PPE).ti,ab. 10864
58 ((isolation or full body or complian*) adj3 (gown* or glove* or apron*)).ti,ab. 131
59 or/50-58 24749
60 exp Health Personnel/ 583197
61 (health* adj3 (HCW or HCWs or HCP or HCPs)).ti,ab. 10331
62 (health* adj3 (worker* or assistant* or personnel)).ti,ab. 77171
63 (clinician* or doctor* or nurs* or first responder* or ambulance* or emergenc* or midwif* or midwive* or medic*).ti,ab. 3239553
64 ((health* or quarantine) adj3 (worker* or assistant* or personnel or practitioner* or profession*)).ti,ab. 217548
65 (allied health adj3 (worker* or assistant* or personnel or practitioner* or profession*)).ti,ab. 3642
66 or/60-65 3646098
67 Cross Infection/ 60195
68 ((cross or nosocomial or hospital or health*) adj2 infecti*).ti,ab. 40083
69 Disease Transmission, Infectious/ 10909
70 Infectious Disease Transmission, Patient-to-Professional/ 5385
71 Infectious Disease Transmission, Professional-to-Patient/ 1912
72 infectious disease transmi* ti,ab. 650
73 or/67-72 99181
74 49 and 59 and 66 and 73 1004
75 limit 74 to yr="2012 - 2022" 943
76 limit 75 to english language 920

Embase Classic+Embase <1947 to 2022 May 27>

1 Severe acute respiratory syndrome coronavirus 2/ 64879
2 SARS-CoV2.ti,ab. 4088
3 SARS coronavirus/ 7970
4 severe acute respiratory syndrome/ 10809
5 severe acute respirat* distress syndrom*.ti,ab. 1633
6 (SARS adj5 (virus* or syndrom*)).ti,ab. 33845
7 Middle East respiratory syndrome coronavirus/ 4520
8 (MERS or middle east respirat* syndrom*).ti,ab. 8448
9 Coronavirinae/ 4042
10 Coronavirus infection/ 12679
11 influenza/ 76269

12 ((influenza* or flu or grippe*) adj5 human*).ti,ab. 10192
13 (novel coronavirus* or novel corona virus* or ncov* or covid 19 or covid-19 or covid19).ti,ab. 236007
14 coronavirus disease 2019/ 217818
15 (("2019" or "19") adj1 (ncov or covid or novel)).ti,ab. 233528
16 (coronavir* or corona virus* or COVID).ti,ab. 265073
17 Betacoronavirus/ 7696
18 (betacoronavirus* or "hcov-hku1").ti,ab. 1068
19 Influenza A virus/ 5775
20 Influenzavirus A/ 41
21 "Influenza A virus (H1N1)"/ 5478
22 "influenza A virus*".ti,ab. 17161
23 Influenza B virus/ 2069
24 Influenzavirus B/ 26
25 "influenza B virus*".ti,ab. 2344
26 common cold/ 10763
27 (common cold* or catarrh*).ti,ab. 16055
28 Rhinovirus/ 7808
29 rhinovirus*.ti,ab. 9388
30 Adenoviridae/ 9383
31 (adenovirida* or adenovirus*).ti,ab. 61454
32 H1N1.ti,ab. 24212
33 ("H1N1" adj5 (virus* or influenza*)).ti,ab. 18697
34 Human respiratory syncytial virus/ 6642
35 (respiratory syncytial virus* adj3 human*).ti,ab. 2395
36 (rsv adj3 virus*).ti,ab. 12552
37 (rsv adj3 virus* adj3 human*).ti,ab. 894
38 Human parainfluenza virus 1/ 630
39 Human parainfluenza virus 3/ 753
40 (parainfluenza virus adj3 ("1" or "3")).ti,ab. 1787
41 (parainfluenza virus* adj3 human* adj3 ("1" or "3")).ti,ab. 726
42 "variant* of concern".ti,ab. 1980
43 (VOC* adj5 virus*).ti,ab. 67
44 "variant* of interest".ti,ab. 569
45 (VOI* adj5 virus*).ti,ab. 39
46 (SARS adj5 (variant* or interest*)).ti,ab. 4839
47 ((Alpha or Beta or Delta or Gamma or Omicron) adj5 variant*).ti,ab. 12616
48 (sub?variant* or sub-variant*).ti,ab. 324
49 or/1-48 524709
50 glove/ or protective glove/ 8570
51 (protecti* adj3 glove*).ti,ab. 1229
52 surgical glove/ 4003
53 (surgical adj3 glove*).ti,ab. 1540
54 protective clothing/ 12446
55 (protect* adj3 cloth*).ti,ab. 2883
56 protective equipment/ 25095
57 (personal protective equipment* or PPE).ti,ab. 13258
58 ((isolation or full body or complian*) adj3 (gown* or glove* or apron*)).ti,ab. 191
59 or/50-58 55186
60 exp health care personnel/ 1863172
61 (health* adj3 (HCW or HCWs or HCP or HCPs)).ti,ab. 15301

62 (health* adj3 (worker* or assistant* or personnel)).ti,ab. 94322
63 (clinician* or doctor* or nurs* or first responder* or ambulance* or emergenc* or midwif* or midwive* or medic*).ti,ab. 4708930
64 ((health* or quarantine) adj3 (worker* or assistant* or personnel or practitioner* or profession*)).ti,ab. 280466
65 (allied health adj3 (worker* or assistant* or personnel or practitioner* or profession*)).ti,ab. 5583
66 or/60-65 5798261
67 cross infection/ 23273
68 ((cross or nosocomial or hospital or health*) adj2 infecti*).ti,ab. 58362
69 disease transmission/ 108351
70 patient-to-professional transmission/ 18
71 professional-to-patient transmission/ 9
72 infectious disease transmi*.ti,ab. 741
73 or/67-72 178968
74 49 and 59 and 66 and 73 1386
75 limit 74 to yr="2012 - 2022" 1278
76 limit 75 to english language 1255

EBM Reviews - Cochrane Central Register of Controlled Trials <April 2022>

1 SARS-CoV-2/ 916
2 SARS-CoV2.ti,ab. 314
3 SARS Virus/ 9
4 Severe Acute Respiratory Syndrome/ 366
5 severe acute respirat* distress syndrom* ti,ab. 157
6 (SARS adj5 (virus* or syndrom*)).ti,ab. 1065
7 Middle East Respiratory Syndrome Coronavirus/ 2
8 (MERS or middle east respirat* syndrom*).ti,ab. 170
9 Coronavirus/ 4
10 Coronavirus Infections/ 669
11 Influenza, Human/ 2930
12 ((influenza* or flu or grippe*) adj5 human*).ti,ab. 302
13 (novel coronavirus* or novel corona virus* or ncov* or covid 19 or covid-19 or covid19).ti,ab. 10129
14 COVID-19/ 1681
15 (("2019" or "19") adj1 (ncov or covid or novel)).ti,ab. 9981
16 (coronavir* or corona virus* or COVID).ti,ab. 10544
17 Betacoronavirus/ 118
18 (betacoronavirus* or "hcov-hku1").ti,ab. 25
19 Influenza A virus/ 413
20 Influenzavirus A/ 6
21 Influenza A Virus, H1N1 Subtype/ 408
22 "influenza A virus*".ti,ab. 253
23 Influenza B virus/ 298
24 Influenzavirus B/ 7
25 "influenza B virus*".ti,ab. 97
26 Common Cold/ 529
27 (common cold* or catarrh*).ti,ab. 1427
28 Rhinovirus/ 148
29 rhinovirus*.ti,ab. 459
30 Adenoviridae/ 153
31 (adenovirida* or adenovirus*).ti,ab. 844

32 H1N1.ti,ab. 1332
33 ("H1N1" adj5 (virus* or influenza*)).ti,ab. 860
34 Respiratory Syncytial Virus, Human/ 74
35 (respiratory syncytial virus* adj3 human*).ti,ab. 59
36 (rsv adj3 virus*).ti,ab. 641
37 (rsv adj3 virus* adj3 human*).ti,ab. 32
38 Parainfluenza Virus 1, Human/ 5
39 Parainfluenza Virus 3, Human/ 15
40 (parainfluenza virus adj3 ("1" or "3")).ti,ab. 39
41 (parainfluenza virus* adj3 human* adj3 ("1" or "3")).ti,ab. 18
42 "variant* of concern".ti,ab. 33
43 (VOC* adj5 virus*).ti,ab. 1
44 "variant* of interest".ti,ab. 9
45 (VOI* adj5 virus*).ti,ab. 4
46 (SARS adj5 (variant* or interest*)).ti,ab. 70
47 ((Alpha or Beta or Delta or Gamma or Omicron) adj5 variant*).ti,ab. 144
48 (sub?variant* or sub-variant*).ti,ab. 3
49 or/1-48 18081
50 Gloves, Protective/ 75
51 (protecti* adj3 glove*).ti,ab. 47
52 Gloves, Surgical/ 148
53 (surgical adj3 glove*).ti,ab. 128
54 Protective Clothing/ 254
55 (protect* adj3 cloth*).ti,ab. 159
56 Personal Protective Equipment/ 60
57 (personal protective equipment* or PPE).ti,ab. 496
58 ((isolation or full body or complian*) adj3 (gown* or glove* or apron*)).ti,ab. 13
59 or/50-58 1165
60 exp Health Personnel/ 10279
61 (health* adj3 (HCW or HCWs or HCP or HCPs)).ti,ab. 737
62 (health* adj3 (worker* or assistant* or personnel)).ti,ab. 6206
63 (clinician* or doctor* or nurs* or first responder* or ambulance* or emergenc* or midwif* or midwive* or medic*).ti,ab. 336290
64 ((health* or quarantine) adj3 (worker* or assistant* or personnel or practitioner* or profession*)).ti,ab. 15132
65 (allied health adj3 (worker* or assistant* or personnel or practitioner* or profession*)).ti,ab. 248
66 or/60-65 348223
67 Cross Infection/ 1209
68 ((cross or nosocomial or hospital or health*) adj2 infecti*).ti,ab. 2525
69 Disease Transmission, Infectious/ 119
70 Infectious Disease Transmission, Patient-to-Professional/ 71
71 Infectious Disease Transmission, Professional-to-Patient/ 27
72 infectious disease transmi*.ti,ab. 10
73 or/67-72 3561
74 49 and 59 and 66 and 73 24
75 limit 74 to yr="2012 - 2022" 24
76 limit 75 to english language 23

Review 3: On what surfaces and objects, and for how long, can SARS-CoV-2 viruses be detected? Is there evidence for human infection of SARS-CoV-2 from fomites?

Ovid MEDLINE(R) ALL <1946 to May 27, 2022>

1 SARS-CoV-2/ 126614
2 SARS-CoV2.ti,ab. 2666
3 Influenza, Human/ 55016
4 ((influenza* or flu or grippe*) adj5 human*).ti,ab. 8757
5 (novel coronavirus* or novel corona virus* or ncov* or covid 19 or covid-19 or covid19).ti,ab. 220863
6 COVID-19/ 163317
7 (("2019" or "19") adj1 (ncov or covid or novel)).ti,ab. 219008
8 (coronavir* or corona virus* or COVID).ti,ab. 247940
9 Influenza A virus/ 22247
10 Influenzavirus A/ 273
11 Influenza A Virus, H1N1 Subtype/ 16924
12 "influenza A virus*".ti,ab. 14881
13 Influenza B virus/ 4537
14 Influenzavirus B/ 175
15 "influenza B virus*".ti,ab. 1988
16 "variant* of concern".ti,ab. 1818
17 (VOC* adj5 virus*).ti,ab. 58
18 "variant* of interest".ti,ab. 356
19 (VOI* adj5 virus*).ti,ab. 39
20 (SARS adj5 (variant* or interest*)).ti,ab. 4653
21 ((Alpha or Beta or Delta or Gamma or Omicron) adj5 variant*).ti,ab. 11760
22 (sub?variant* or sub-variant*).ti,ab. 253
23 or/1-22 352858
24 Fomites/ 619
25 fomite*.ti,ab,kf. 1279
26 fomes.ti,ab,kf. 188
27 (surface* adj3 (contaminat* or contagio* or microb* or surviva* or stability or viability or viable or persisten* or transmi*)).ti,ab,kf. 14203
28 (high* contact* adj7 (object* or surface* or material* or item* or utensil*)).ti,ab,kf. 181
29 (high* touch* adj7 (object* or surface* or material* or item* or utensil*)).ti,ab,kf. 285
30 (frequent* contact* adj7 (object* or surface* or material* or item* or utensil*)).ti,ab,kf. 32
31 (frequent* touch* adj7 (object* or surface* or material* or item* or utensil*)).ti,ab,kf. 113
32 ((porous or non porous or inanimate) adj1 (object* or surface* or material* or item* or utensil*)).ti,ab,kf. 7723
33 ((disease* or environment* or infect*) adj1 reservoir*).ti,ab,kf. 1573
34 or/24-33 25262
35 23 and 34 1007
36 limit 35 to yr="2012 - 2022" 926
37 limit 36 to english language 913

Embase Classic+Embase <1947 to 2022 May 27>

1 Severe acute respiratory syndrome coronavirus 2/ 64879
2 SARS-CoV2.ti,ab. 4088

3 SARS coronavirus/ 7970
4 (SARS adj5 (virus* or syndrom*)).ti,ab. 33845
5 Influenza, Human/ 27519
6 ((influenza* or flu or grippe*) adj5 human*).ti,ab. 10192
7 (novel coronavirus* or novel corona virus* or ncov* or covid 19 or covid-19 or covid19).ti,ab. 236007
8 coronavirus disease 2019/ 217818
9 (("2019" or "19") adj1 (ncov or covid or novel)).ti,ab. 233528
10 (coronavir* or corona virus* or COVID).ti,ab. 265073
11 Influenza A virus/ 5775
12 Influenzavirus A/ 41
13 Influenza A Virus, H1N1 Subtype/ 4869
14 "influenza A virus*".ti,ab. 17161
15 Influenza B virus/ 2069
16 Influenzavirus B/ 26
17 "influenza B virus*".ti,ab. 2344
18 "variant* of concern".ti,ab. 1980
19 (VOC* adj5 virus*).ti,ab. 67
20 "variant* of interest".ti,ab. 569
21 (VOI* adj5 virus*).ti,ab. 39
22 (SARS adj5 (variant* or interest*)).ti,ab. 4839
23 ((Alpha or Beta or Delta or Gamma or Omicron) adj5 variant*).ti,ab. 12616
24 (sub?variant* or sub-variant*).ti,ab. 324
25 or/1-24 364375
26 fomite/ 773
27 fomite transmission/ 67
28 fomite*.ti,ab,kf. 1508
29 fomes.ti,ab,kf. 217
30 (surface* adj3 (contaminat* or contagio* or microb* or surviva* or stability or viability or viable or persisten* or transmi*)).ti,ab,kf. 16002
31 (high* contact* adj7 (object* or surface* or material* or item* or utensil*)).ti,ab,kf. 189
32 (high* touch* adj7 (object* or surface* or material* or item* or utensil*)).ti,ab,kf. 466
33 (frequent* contact* adj7 (object* or surface* or material* or item* or utensil*)).ti,ab,kf. 44
34 (frequent* touch* adj7 (object* or surface* or material* or item* or utensil*)).ti,ab,kf. 140
35 ((porous or non porous or inanimate) adj1 (object* or surface* or material* or item* or utensil*)).ti,ab,kf. 7500
36 ((disease* or environment* or infect*) adj1 reservoir*).ti,ab,kf. 1883
37 or/26-36 27496
38 25 and 37 1026
39 limit 38 to yr="2012 - 2022" 954
40 limit 39 to english language 932

EBM Reviews - Cochrane Central Register of Controlled Trials <April 2022>

1 SARS-CoV-2/ 916
2 SARS-CoV2.ti,ab. 314
3 Influenza, Human/ 2930
4 ((influenza* or flu or grippe*) adj5 human*).ti,ab. 302
5 (novel coronavirus* or novel corona virus* or ncov* or covid 19 or covid-19 or covid19).ti,ab. 10129
6 COVID-19/ 1681

7 (("2019" or "19") adj1 (ncov or covid or novel)).ti,ab. 9981
8 (coronavir* or corona virus* or COVID).ti,ab. 10544
9 Influenza A virus/ 413
10 Influenzavirus A/ 6
11 Influenza A Virus, H1N1 Subtype/ 408
12 "influenza A virus*".ti,ab. 253
13 Influenza B virus/ 298
14 Influenzavirus B/ 7
15 "influenza B virus*".ti,ab. 97
16 "variant* of concern".ti,ab. 33
17 (VOC* adj5 virus*).ti,ab. 1
18 "variant* of interest".ti,ab. 9
19 (VOI* adj5 virus*).ti,ab. 4
20 (SARS adj5 (variant* or interest*)).ti,ab. 70
21 ((Alpha or Beta or Delta or Gamma or Omicron) adj5 variant*).ti,ab. 144
22 (sub?variant* or sub-variant*).ti,ab. 3
23 or/1-22 14226
24 Fomites/ 12
25 fomite*.ti,ab,kf. 29
26 fomes.ti,ab,kf. 0
27 (surface* adj3 (contaminat* or contagio* or microb* or surviva* or stability or viability or viable or persisten* or transmi*)).ti,ab,kf. 260
28 (high* contact* adj7 (object* or surface* or material* or item* or utensil*)).ti,ab,kf. 1
29 (high* touch* adj7 (object* or surface* or material* or item* or utensil*)).ti,ab,kf. 24
30 (frequent* contact* adj7 (object* or surface* or material* or item* or utensil*)).ti,ab,kf. 6
31 (frequent* touch* adj7 (object* or surface* or material* or item* or utensil*)).ti,ab,kf. 8
32 ((porous or non porous or inanimate) adj1 (object* or surface* or material* or item* or utensil*)).ti,ab,kf. 55
33 ((disease* or environment* or infect*) adj1 reservoir*).ti,ab,kf. 27
34 or/24-33 396
35 23 and 34 25
36 limit 35 to yr="2012 - 2022" 23
37 limit 36 to english language 23

Review 4: How effective are cleaning and disinfection interventions in preventing SARS-CoV-2 transmission and/or reducing SARS-CoV-2 viability or detection on surfaces?

Ovid MEDLINE(R) ALL <1946 to May 27, 2022>

1 SARS-CoV-2/ 126614
2 SARS-CoV2.ti,ab. 2666
3 (novel coronavirus* or novel corona virus* or ncov* or covid 19 or covid-19 or covid19).ti,ab. 220863
4 COVID-19/ 163317
5 (("2019" or "19") adj1 (ncov or covid or novel)).ti,ab. 219008
6 (coronavir* or corona virus* or COVID).ti,ab. 247940
7 "variant* of concern".ti,ab. 1818
8 (VOC* adj5 virus*).ti,ab. 58
9 "variant* of interest".ti,ab. 356
10 (VOI* adj5 virus*).ti,ab. 39
11 (SARS adj5 (variant* or interest*)).ti,ab. 4653
12 ((Alpha or Beta or Delta or Gamma or Omicron) adj5 variant*).ti,ab. 11760
13 (sub?variant* or sub-variant*).ti,ab. 253
14 or/1-13 275435
15 Ultraviolet Rays/ 81584
16 ((ultra?violet or UV or UV-C or ultra?violet-C) adj3 (light* or wave* or radiat* or irradiat*)).ti,ab,kf. 80886
17 Sodium Hypochlorite/ 5104
18 (sodium hypochlorit* or c?lor?x or bleach).ti,ab,kf. 9145
19 Acetic Acid/ 10839
20 (acetic acid* or vinegar*).ti,ab,kf. 47978
21 Ethanol/ 92309
22 (ethanol or ethyl alcohol*).ti,ab,kf. 133212
23 Detergents/ 17651
24 (detergent* or (clean?ing adj1 agent*)).ti,ab,kf. 44853
25 Quaternary Ammonium Compounds/ 25097
26 quaternary ammonium.ti,ab,kf. 7453
27 Antiviral Agents/ 93697
28 ((antiviral or vir?cidal) adj1 agent*).ti,ab,kf. 11659
29 Soaps/ 2660
30 soap*1.ti,ab,kf. 7030
31 Emulsifying Agents/ 1748
32 (emulsify* adj1 agent*).ti,ab,kf. 425
33 Disinfectants/ 14338
34 chlorine dioxide*.ti,ab,kf. 1431
35 free chlorine*.ti,ab,kf. 1290
36 Hydrogen Peroxide/ 65892
37 (hydrogen adj1 peroxide*).ti,ab,kf. 61405
38 or/15-37 632026
39 Disinfection/ 16646
40 (disinfect* or saniti* or clean*).ti,ab,kf. 136068
41 or/39-40 140862
42 38 and 41 24016

43 (surface* or object*1 or material* or item*1 or utensil* or environment* or fomite* or fomes).ti,ab,kf. 3868784
44 ((clean* or disinfect* or sanitis*) adj5 (method* or practi* or complian* or manual* or checklist* or protocol* or regimen* or routine* or technique* or strateg*)).ti,ab,kf. 15141
45 ((kill* or inactivat* or remov* or destroy*) adj2 (virus* or pathogen* or microb* or viral or contamin* or decontamin*)).ti,ab,kf. 22078
46 14 and 42 799
47 14 and 38 and 43 1406
48 14 and 38 and 44 140
49 14 and 38 and 45 236
50 14 and 41 and 43 1579
51 14 and 41 and 44 422
52 14 and 41 and 45 174
53 14 and 43 and 44 256
54 14 and 43 and 45 323
55 or/46-54 3238
56 limit 55 to yr="2012 - 2022" 3125
57 limit 56 to english language 3060

Embase Classic+Embase <1947 to 2022 May 27>

1 Severe acute respiratory syndrome coronavirus 2/ 64879
2 SARS-CoV2.ti,ab. 4088
3 SARS coronavirus/ 7970
4 (SARS adj5 (virus* or syndrom*)).ti,ab. 33845
5 (novel coronavirus* or novel corona virus* or ncov* or covid 19 or covid-19 or covid19).ti,ab. 236007
6 coronavirus disease 2019/ 217818
7 (("2019" or "19") adj1 (ncov or covid or novel)).ti,ab. 233528
8 (coronavir* or corona virus* or COVID).ti,ab. 265073
9 "variant* of concern".ti,ab. 1980
10 (VOC* adj5 virus*).ti,ab. 67
11 "variant* of interest".ti,ab. 569
12 (VOI* adj5 virus*).ti,ab. 39
13 (SARS adj5 (variant* or interest*)).ti,ab. 4839
14 ((Alpha or Beta or Delta or Gamma or Omicron) adj5 variant*).ti,ab. 12616
15 (sub?variant* or sub-variant*).ti,ab. 324
16 or/1-15 311889
17 ultraviolet radiation/ 113749
18 ((ultra?violet or UV or UV-C or ultra?violet-C) adj3 (light* or wave* or radiat* or irradiat*)).ti,ab,kf. 93625
19 hypochlorite sodium/ 9603
20 (sodium hypochlorit* or c?lor?x or bleach).ti,ab,kf. 10171
21 acetic acid/ 71233
22 (acetic acid* or vinegar*).ti,ab,kf. 62593
23 alcohol/ 303859
24 (ethanol or ethyl alcohol*).ti,ab,kf. 181171
25 detergent/ 22836
26 (detergent* or (clean?ing adj1 agent*)).ti,ab,kf. 52189
27 quaternary ammonium derivative/ 17271
28 quaternary ammonium.ti,ab,kf. 8799

29 antivirus agent/ 92312
30 ((antiviral or vir?cidal) adj1 agent*).ti,ab,kf. 15769
31 soap/ 6437
32 soap*1.ti,ab,kf. 10145
33 emulsifying agent/ 4469
34 (emulsify* adj1 agent*).ti,ab,kf. 700
35 disinfectant agent/ 16007
36 chlorine dioxide/ 1943
37 chlorine dioxide*.ti,ab,kf. 1767
38 free chlorine*.ti,ab,kf. 1645
39 hydrogen peroxide/ 110077
40 (hydrogen adj1 peroxide*).ti,ab,kf. 73538
41 or/17-40 940585
42 disinfection/ 31903
43 (disinfect* or saniti* or clean*).ti,ab,kf. 181272
44 or/42-43 190987
45 41 and 44 34552
46 (surface* or object*1 or material* or item*1 or utensil* or environment* or fomite* or fomes).ti,ab,kf. 4919568
47 ((clean* or disinfect* or sanitis*) adj5 (method* or practi* or complian* or manual* or checklist* or protocol* or regimen* or routine* or technique* or strateg*)).ti,ab,kf. 20849
48 ((kill* or inactivat* or remov* or destroy*) adj2 (virus* or pathogen* or microb* or viral or contamin* or decontamin*)).ti,ab,kf. 28105
49 16 and 45 1223
50 16 and 41 and 46 1716
51 16 and 41 and 47 179
52 16 and 41 and 48 243
53 16 and 44 and 46 1722
54 16 and 44 and 47 426
55 16 and 44 and 48 152
56 16 and 46 and 47 254
57 16 and 46 and 48 272
58 or/49-57 3803
59 limit 58 to yr="2012 - 2022" 3645
60 limit 59 to english language 3538

EBM Reviews - Cochrane Central Register of Controlled Trials <April 2022>

1 SARS-CoV-2/ 916
2 SARS-CoV2.ti,ab. 314
3 (novel coronavirus* or novel corona virus* or ncov* or covid 19 or covid-19 or covid19).ti,ab. 10129
4 COVID-19/ 1681
5 (("2019" or "19") adj1 (ncov or covid or novel)).ti,ab. 9981
6 (coronavir* or corona virus* or COVID).ti,ab. 10544
7 "variant* of concern".ti,ab. 33
8 (VOC* adj5 virus*).ti,ab. 1
9 "variant* of interest".ti,ab. 9
10 (VOI* adj5 virus*).ti,ab. 4
11 (SARS adj5 (variant* or interest*)).ti,ab. 70
12 ((Alpha or Beta or Delta or Gamma or Omicron) adj5 variant*).ti,ab. 144

13 (sub?variant* or sub-variant*).ti,ab. 3
14 or/1-13 10864
15 Ultraviolet Rays/ 717
16 ((ultra?violet or UV or UV-C or ultra?violet-C) adj3 (light* or wave* or radiat* or irradiat*)).ti,ab,kf. 1616
17 Sodium Hypochlorite/ 487
18 (sodium hypochlorit* or c?lor?x or bleach).ti,ab,kf. 789
19 Acetic Acid/ 213
20 (acetic acid* or vinegar*).ti,ab,kf. 1061
21 Ethanol/ 3555
22 (ethanol or ethyl alcohol*).ti,ab,kf. 3474
23 Detergents/ 136
24 (detergent* or (clean?ing adj1 agent*)).ti,ab,kf. 694
25 Quaternary Ammonium Compounds/ 285
26 quaternary ammonium.ti,ab,kf. 91
27 Antiviral Agents/ 4222
28 ((antiviral or vir?cidal) adj1 agent*).ti,ab,kf. 598
29 Soaps/ 249
30 soap*1.ti,ab,kf. 1157
31 Emulsifying Agents/ 15
32 (emulsify* adj1 agent*).ti,ab,kf. 9
33 Disinfectants/ 289
34 chlorine dioxide*.ti,ab,kf. 64
35 free chlorine*.ti,ab,kf. 18
36 Hydrogen Peroxide/ 709
37 (hydrogen adj1 peroxide*).ti,ab,kf. 1303
38 or/15-37 18296
39 Disinfection/ 371
40 (disinfect* or saniti* or clean*).ti,ab,kf. 11889
41 or/39-40 11994
42 38 and 41 1564
43 (surface* or object*1 or material* or item*1 or utensil* or environment* or fomite* or fomes).ti,ab,kf. 175716
44 ((clean* or disinfect* or sanitis*) adj5 (method* or practi* or complian* or manual* or checklist* or protocol* or regimen* or routine* or technique* or strateg*)).ti,ab,kf. 1619
45 ((kill* or inactivat* or remov* or destroy*) adj2 (virus* or pathogen* or microb* or viral or contamin* or decontamin*)).ti,ab,kf. 668
46 14 and 42 24
47 14 and 38 and 43 43
48 14 and 38 and 44 3
49 14 and 38 and 45 3
50 14 and 41 and 43 55
51 14 and 41 and 44 10
52 14 and 41 and 45 2
53 14 and 43 and 44 5
54 14 and 43 and 45 7
55 or/46-54 108
56 limit 55 to yr="2012 - 2022" 107
57 limit 56 to english language 104

Review 5: What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 / influenza infection in HCWs and the general population? [review of primary studies] Update of Review 1 from 1st December 2021 to review primary studies.

Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions <1946 to May 18, 2022>

1 N95 Respirators/ 258
2 Masks/ 6664
3 Respiratory Protective Devices/ 2381
4 (respirat* adj3 (devic* or air purif*)).ti,ab. 1248
5 (filter* adj1 face$piece adj1 respirat*).ti,ab. 391
6 ((N95 or KN94 or KN95 or P2 or FFP2) adj8 (mask* or face* or face$piece* or respirat* or ffr* or airborne or droplet*)).ti,ab. 1719
7 (P2 adj N95).ti,ab. 11
8 particulate respirator*.ti,ab. 88
9 (respirat* adj3 (filtrat* or filter*)).ti,ab. 800
10 (mask or masks or face$mask* or face$piece*).ti,ab. 46918
11 ((airborne or aerosol or droplet*) adj5 (mask or masks or face$mask* or face$piece*)).ti,ab. 327
12 Inhalation Exposure/pc 592
13 or/1-12 51561
14 SARS-CoV-2/ 125004
15 SARS-CoV2.ti,ab. 2641
16 SARS Virus/ 4059
17 Severe Acute Respiratory Syndrome/ 5690
18 severe acute respirat* distress syndrom*.ti,ab. 1185
19 (SARS adj5 (virus* or syndrom*)).ti,ab. 33003
20 Middle East Respiratory Syndrome Coronavirus/ 1833
21 (MERS or middle east respirat* syndrom*).ti,ab. 7711
22 Coronavirus/ 5000
23 Coronavirus Infections/ 45451
24 Influenza, Human/ 54948
25 ((influenza* or flu or grippe*) adj5 human*).ti,ab. 8745
26 (novel coronavirus* or novel corona virus* or ncov* or covid 19 or covid-19 or covid19).ti,ab. 218038
27 COVID-19/ 160560
28 (("2019" or "19") adj1 (ncov or covid or novel)).ti,ab. 216190
29 (coronavir* or corona virus* or COVID).ti,ab. 244879
30 Betacoronavirus/ 33245
31 (betacoronavirus* or "hcov-hku1").ti,ab. 1057
32 Influenza A virus/ 22227
33 Influenzavirus A/ 273
34 Influenza A Virus, H1N1 Subtype/ 16913
35 "influenza A virus*".ti,ab. 14853
36 Influenza B virus/ 4534
37 Influenzavirus B/ 175
38 "influenza B virus*".ti,ab. 1986
39 Common Cold/ 4361

40 (common cold* or catarrh*).ti,ab. 11313
41 Rhinovirus/ 4055
42 rhinovirus*.ti,ab. 6169
43 Adenoviridae/ 28468
44 (adenovirida* or adenovirus*).ti,ab. 47346
45 H1N1.ti,ab. 18969
46 ("H1N1" adj5 (virus* or influenza*)).ti,ab. 14870
47 Respiratory Syncytial Virus, Human/ 3374
48 (respiratory syncytial virus* adj3 human*).ti,ab. 2037
49 (rsv adj3 virus*).ti,ab. 9777
50 (rsv adj3 virus* adj3 human*).ti,ab. 721
51 Parainfluenza Virus 1, Human/ 2865
52 Parainfluenza Virus 3, Human/ 1211
53 (parainfluenza virus adj3 ("1" or "3")).ti,ab. 1473
54 (parainfluenza virus* adj3 human* adj3 ("1" or "3")).ti,ab. 651
55 "variant* of concern".ti,ab. 1753
56 (VOC* adj5 virus*).ti,ab. 57
57 "variant* of interest".ti,ab. 351
58 (VOI* adj5 virus*).ti,ab. 38
59 (SARS adj5 (variant* or interest*)).ti,ab. 4496
60 ((Alpha or Beta or Delta or Gamma or Omicron) adj5 variant*).ti,ab. 11582
61 (sub?variant* or sub-variant*).ti,ab. 249
62 or/14-61 442900
63 13 and 62 7356
64 ((surgical or medical or cloth or fabric) adj3 (mask or masks or face$mask* or face$piece*)).ti,ab. 1856
65 63 and 64 1153
66 limit 65 to yr="2012 - 2022" 1092
67 limit 66 to english language 1060
68 limit 67 to dt=20211201-20220520 198
69 limit 67 to rd=20211201-20220520 397
70 68 or 69 397

Embase Classic+Embase <1947 to 2022 May 18>

1 minimally 94 percent efficient filtering facepiece respirator/ 1941
2 mask/ 8266
3 respiratory protection/ 192
4 (respirat* adj3 (devic* or air purif*)).ti,ab. 1785
5 (filter* adj1 face$piece adj1 respirat*).ti,ab. 372
6 ((N95 or KN94 or KN95 or P2 or FFP2) adj8 (mask* or face* or face$piece* or respirat* or ffr* or airborne or droplet*)).ti,ab. 1918
7 (P2 adj N95).ti,ab. 12
8 particulate respirator*.ti,ab. 96
9 (respirat* adj3 (filtrat* or filter*)).ti,ab. 905
10 (mask or masks or face$mask* or face$piece*).ti,ab. 61733
11 ((airborne or aerosol or droplet*) adj5 (mask or masks or face$mask* or face$piece*)).ti,ab. 396
12 exposure/pc 149
13 or/1-12 66919
14 Severe acute respiratory syndrome coronavirus 2/ 64062

15 SARS-CoV2.ti,ab. 4027
16 SARS coronavirus/ 7928
17 severe acute respiratory syndrome/ 10778
18 severe acute respirat* distress syndrom*.ti,ab. 1625
19 (SARS adj5 (virus* or syndrom*)).ti,ab. 33449
20 Middle East respiratory syndrome coronavirus/ 4503
21 (MERS or middle east respirat* syndrom*).ti,ab. 8423
22 Coronavirinae/ 4032
23 Coronavirus infection/ 12664
24 influenza/ 76141
25 ((influenza* or flu or grippe*) adj5 human*).ti,ab. 10166
26 (novel coronavirus* or novel corona virus* or ncov* or covid 19 or covid-19 or covid19).ti,ab. 232796
27 coronavirus disease 2019/ 214655
28 (("2019" or "19") adj1 (ncov or covid or novel)).ti,ab. 230337
29 (coronavir* or corona virus* or COVID).ti,ab. 261621
30 Betacoronavirus/ 7682
31 (betacoronavirus* or "hcov-hku1").ti,ab. 1056
32 Influenza A virus/ 5726
33 Influenzavirus A/ 40
34 "Influenza A virus (H1N1)"/ 5456
35 "influenza A virus*".ti,ab. 17125
36 Influenza B virus/ 2056
37 Influenzavirus B/ 25
38 "influenza B virus*".ti,ab. 2341
39 common cold/ 10740
40 (common cold* or catarrh*).ti,ab. 16036
41 Rhinovirus/ 7784
42 rhinovirus*.ti,ab. 9372
43 Adenoviridae/ 9337
44 (adenovirida* or adenovirus*).ti,ab. 61373
45 H1N1.ti,ab. 24180
46 ("H1N1" adj5 (virus* or influenza*)).ti,ab. 18674
47 Human respiratory syncytial virus/ 6595
48 (respiratory syncytial virus* adj3 human*).ti,ab. 2391
49 (rsv adj3 virus*).ti,ab. 12524
50 (rsv adj3 virus* adj3 human*).ti,ab. 894
51 Human parainfluenza virus 1/ 626
52 human parainfluenza virus 3/ 748
53 (parainfluenza virus adj3 ("1" or "3")).ti,ab. 1785
54 (parainfluenza virus* adj3 human* adj3 ("1" or "3")).ti,ab. 724
55 "variant* of concern".ti,ab. 1929
56 (VOC* adj5 virus*).ti,ab. 64
57 "variant* of interest".ti,ab. 556
58 (VOI* adj5 virus*).ti,ab. 39
59 (SARS adj5 (variant* or interest*)).ti,ab. 4699
60 ((Alpha or Beta or Delta or Gamma or Omicron) adj5 variant*).ti,ab. 12453
61 (sub?variant* or sub-variant*).ti,ab. 320
62 or/14-61 520370
63 13 and 62 8841
64 ((surgical or medical or cloth or fabric) adj3 (mask or masks or face$mask* or

face$piece*)).ti,ab. 2131
65 63 and 64 1229
66 limit 65 to yr="2012 - 2022" 1153
67 limit 66 to english language 1124
68 limit 67 to dd=20211201-20220520 99
69 limit 67 to rd=20211201-20220520 238
70 limit 67 to dc=20211201-20220520 321
71 68 or 69 or 70 337

EBM Reviews - Cochrane Central Register of Controlled Trials <April 2022>

1 N95 Respirators/ 10
2 Masks/ 546
3 Respiratory Protective Devices/ 77
4 (respirat* adj3 (devic* or air purif*)).ti,ab. 253
5 (filter* adj1 face$piece adj1 respirat*).ti,ab. 11
6 ((N95 or KN94 or KN95 or P2 or FFP2) adj8 (mask* or face* or face$piece* or respirat* or ffr* or airborne or droplet*)).ti,ab. 161
7 (P2 adj N95).ti,ab. 0
8 particulate respirator*.ti,ab. 6
9 (respirat* adj3 (filtrat* or filter*)).ti,ab. 47
10 (mask or masks or face$mask* or face$piece*).ti,ab. 9059
11 ((airborne or aerosol or droplet*) adj5 (mask or masks or face$mask* or face$piece*)).ti,ab. 39
12 Inhalation Exposure/pc 0
13 or/1-12 9376
14 SARS-CoV-2/ 916
15 SARS-CoV2.ti,ab. 314
16 SARS Virus/ 9
17 Severe Acute Respiratory Syndrome/ 366
18 severe acute respirat* distress syndrom*.ti,ab. 157
19 (SARS adj5 (virus* or syndrom*)).ti,ab. 1065
20 Middle East Respiratory Syndrome Coronavirus/ 2
21 (MERS or middle east respirat* syndrom*).ti,ab. 170
22 Coronavirus/ 4
23 Coronavirus Infections/ 669
24 Influenza, Human/ 2930
25 ((influenza* or flu or grippe*) adj5 human*).ti,ab. 302
26 (novel coronavirus* or novel corona virus* or ncov* or covid 19 or covid-19 or covid19).ti,ab. 10129
27 COVID-19/ 1681
28 (("2019" or "19") adj1 (ncov or covid or novel)).ti,ab. 9981
29 (coronavir* or corona virus* or COVID).ti,ab. 10544
30 Betacoronavirus/ 118
31 (betacoronavirus* or "hcov-hku1").ti,ab. 25
32 Influenza A virus/ 413
33 Influenzavirus A/ 6
34 Influenza A Virus, H1N1 Subtype/ 408
35 "influenza A virus*".ti,ab. 253
36 Influenza B virus/ 298
37 Influenzavirus B/ 7

38 "influenza B virus*".ti,ab. 97
39 Common Cold/ 529
40 (common cold* or catarrh*).ti,ab. 1427
41 Rhinovirus/ 148
42 rhinovirus*.ti,ab. 459
43 Adenoviridae/ 153
44 (adenovirida* or adenovirus*).ti,ab. 844
45 H1N1.ti,ab. 1332
46 ("H1N1" adj5 (virus* or influenza*)).ti,ab. 860
47 Respiratory Syncytial Virus, Human/ 74
48 (respiratory syncytial virus* adj3 human*).ti,ab. 59
49 (rsv adj3 virus*).ti,ab. 641
50 (rsv adj3 virus* adj3 human*).ti,ab. 32
51 Parainfluenza Virus 1, Human/ 5
52 Parainfluenza Virus 3, Human/ 15
53 (parainfluenza virus adj3 ("1" or "3")).ti,ab. 39
54 (parainfluenza virus* adj3 human* adj3 ("1" or "3")).ti,ab. 18
55 "variant* of concern".ti,ab. 33
56 (VOC* adj5 virus*).ti,ab. 1
57 "variant* of interest".ti,ab. 9
58 (VOI* adj5 virus*).ti,ab. 4
59 (SARS adj5 (variant* or interest*)).ti,ab. 70
60 ((Alpha or Beta or Delta or Gamma or Omicron) adj5 variant*).ti,ab. 144
61 (sub?variant* or sub-variant*).ti,ab. 3
62 or/14-61 18081
63 13 and 62 455
64 ((surgical or medical or cloth or fabric) adj3 (mask or masks or face$mask* or face$piece*)).ti,ab. 239
65 63 and 64 108
66 limit 65 to yr="2012 - 2022" 90
67 limit 66 to english language 89
68 ("202112" or "202201" or "202202" or "202203" or "202204").up. 1496855
69 67 and 68 74

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RAPID REVIEWS OF SARS-COV-2 TOPICS FOR INFECTION PREVENTION AND CONTROL GUIDANCE DEVELOPMENT

FINDINGS OF RAPID EVIDENCE REVIEWS 1 AND 5:

- Review 1: What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 infection in HCWs and the general population? [review of reviews]
- Review 5: What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 / influenza infection in HCWs and the general population? [review of primary studies]

JUNE 10, 2022

Twitter: **@MonashMSDI, @BehavWorksAus**

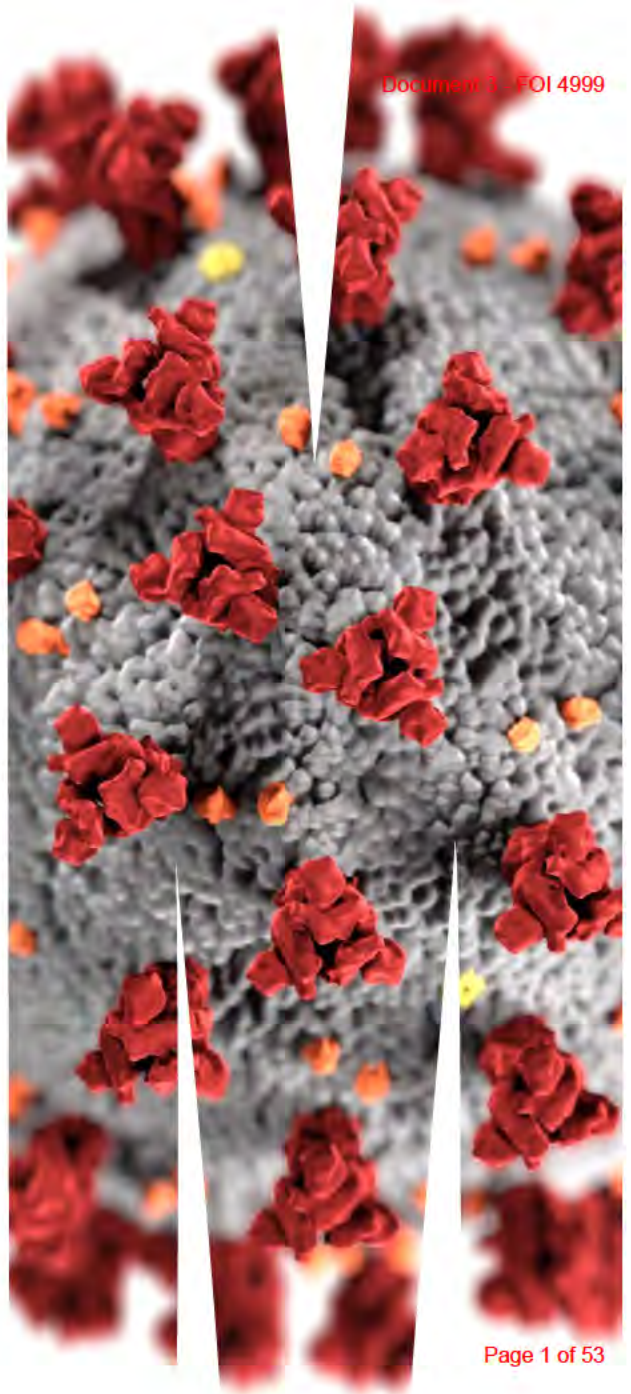

Photo by CDC on Unsplash

This Power Point presentation represents the work conducted by Dr Paul Kellner, Dr Brea Kunstler, Associate Professor Peter Bragge, Dr Sarah McGuinness, Professor Karin Leder, Ms Veronica Delafosse and Ms Diki Tsering.

Declarations of Conflict of Interest

The authors have no conflicts to declare.

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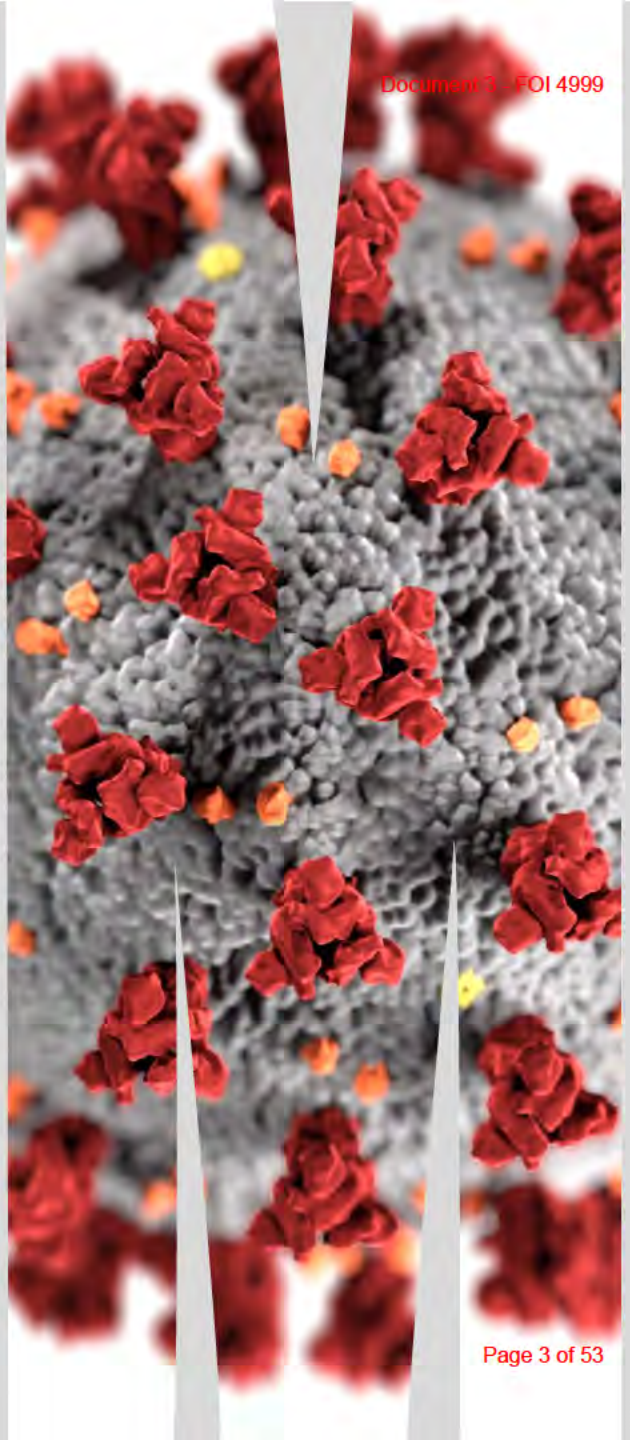
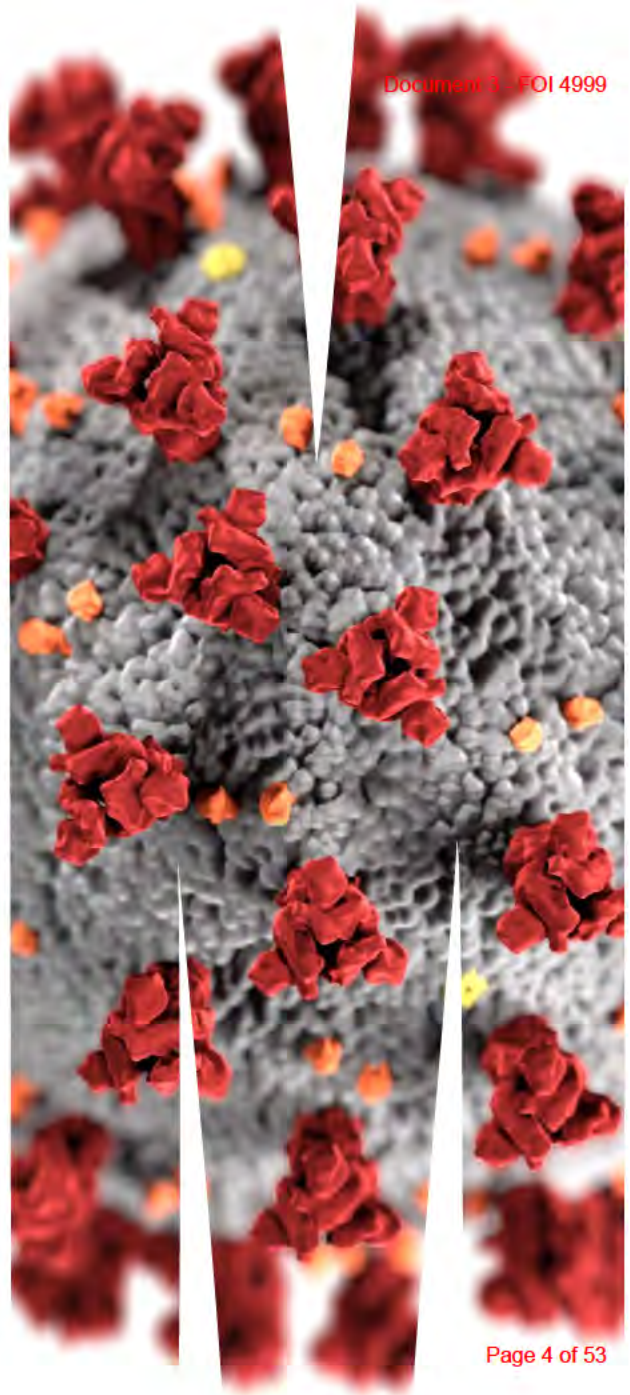
Review 1: What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 infection in HCWs and the general population? [review of reviews]



What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 infection in HCWs and the general population? [review of reviews]

Background and methods



INTRODUCTION

The COVID-19 pandemic has increased awareness of the importance of personal protective equipment (PPE) in preventing SARS-CoV-2 infection in the general public and in the healthcare workers (HCWs) who treat them. It is important to identify the evidence supporting or refuting the use of PPE (specifically masks, respirators, gowns and gloves) to prevent SARS-CoV-2 infection.

The purpose of this presentation is to present findings of two rapid evidence review addressing the questions:

- What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 infection in HCWs and the general population? [review of reviews]
- What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 / influenza infection in HCWs and the general population? [review of primary studies]

Every effort was made to ensure all relevant literature was captured and used to inform the findings presented in this presentation.

IMPORTANT CONSIDERATIONS FOR INTERPRETING THE RESULTS OF THIS REVIEW

1. The **date of the literature search** of the review (and any reviews contained within it), and whether the review is 'living' (continuously updated) will indicate how much recent research may not have been captured

2. **Pre-prints (if included) have not been subject to peer-review**

3. **Review parameters are adjusted to meet to timelines** (Speckemeier et al. 2022), and therefore some relevant literature may not be captured. Parameters include:

- Adjusting the year range of the search: ***this review focused on publications from 2012 – 2022***
- Focusing on specific study designs: ***this review focused on systematic reviews only***
- Adjusting target interventions or phenomena: ***this review focused on SARS-CoV-2 only***
- Limiting outcome measure type (e.g., PCR vs culture)

4. **Covariates** that are unaccounted for within individual studies and / or reviews can under- or overestimate findings.

Speckemeier C, Niemann A, Wasem J, Buchberger B, Neusser S. Methodological guidance for rapid reviews in healthcare: A scoping review. *Res Synth Methods*. 2022;(May 2021):1-11. doi:10.1002/jrsm.1555

What is the comparative efficacy of respirators (e.g. N95, P2, PFR) and surgical masks in preventing SARS-CoV-2 infection in HCWs and the general population? [review of reviews]

METHODS

Databases*	• Cochrane Central Register of Controlled Trials <2012 to Jan 2022> **UPDATED April 2022*** • Ovid MEDLINE(R) ALL <2012 to March 4 2022> **UPDATED May 18, 2022>** • Embase Classic+Embase <2012 to March 4 2022> **UPDATED May 18, 2022>**
Inclusion criteria	• **Study type:** Systematic reviews • **Population/Surfaces:** Healthcare and non-healthcare settings • **Intervention:** P2/N95 and equivalent respirators • **Comparison:** Surgical masks • **Outcome:** Infection with SARS-CoV-2 (measured using PCR or serology)
Screening	• Citation / abstract screening was undertaken by two researchers • Full text screening was undertaken by two researchers
Quality appraisal	Systematic reviews appraised with AMSTAR II (Shea et al. 2017) by one researcher Primary studies appraised using a purposefully designed tool by one researcher • 'High quality' defined as >50% of applicable AMSTAR II criteria met • 'Low quality' defined as ≤ 50% of applicable AMSTAR II criteria met
Data extraction	• Data extraction was undertaken by one researcher and checked by another

*Cochrane Central is updated monthly, therefore the updated search on May 20, 2022 covered to the end of April 2022

Shea BJ, Reeves BC, Wells G, et al. AMSTAR 2: a critical appraisal tool for systematic reviews that include randomised or non-randomised studies of healthcare interventions, or both. *BMJ*. 2017;358:j4008. doi:10.1136/bmj.j4008

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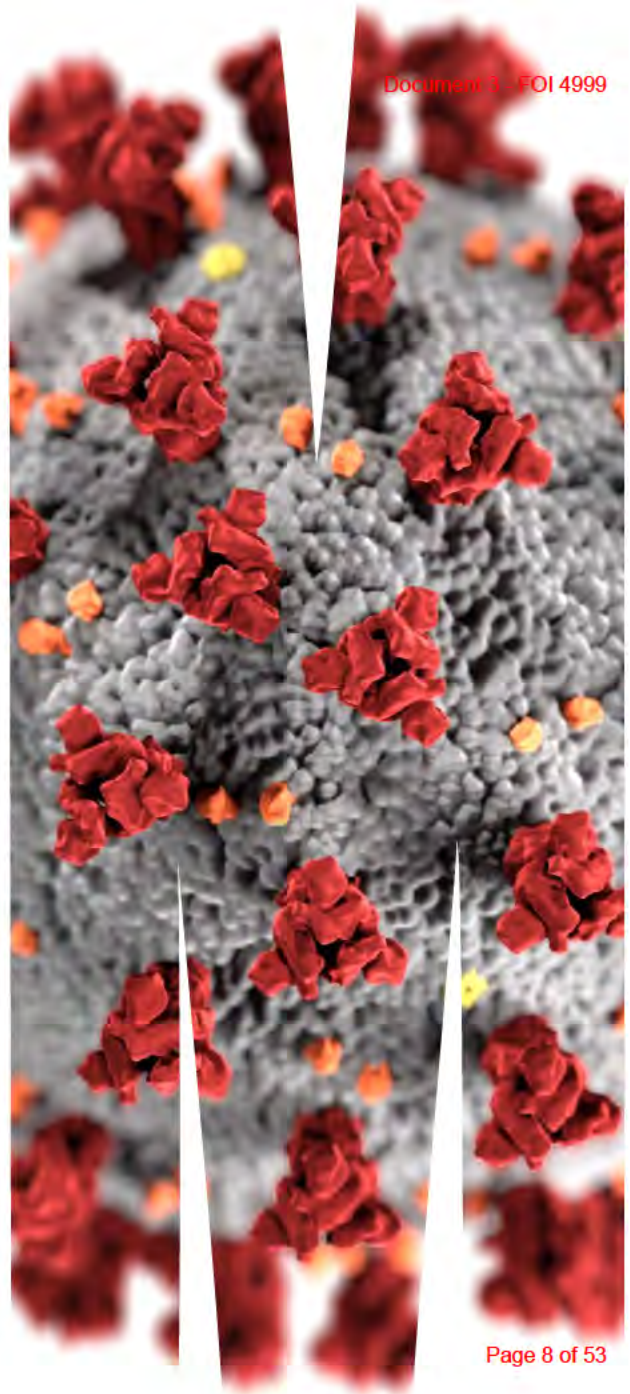
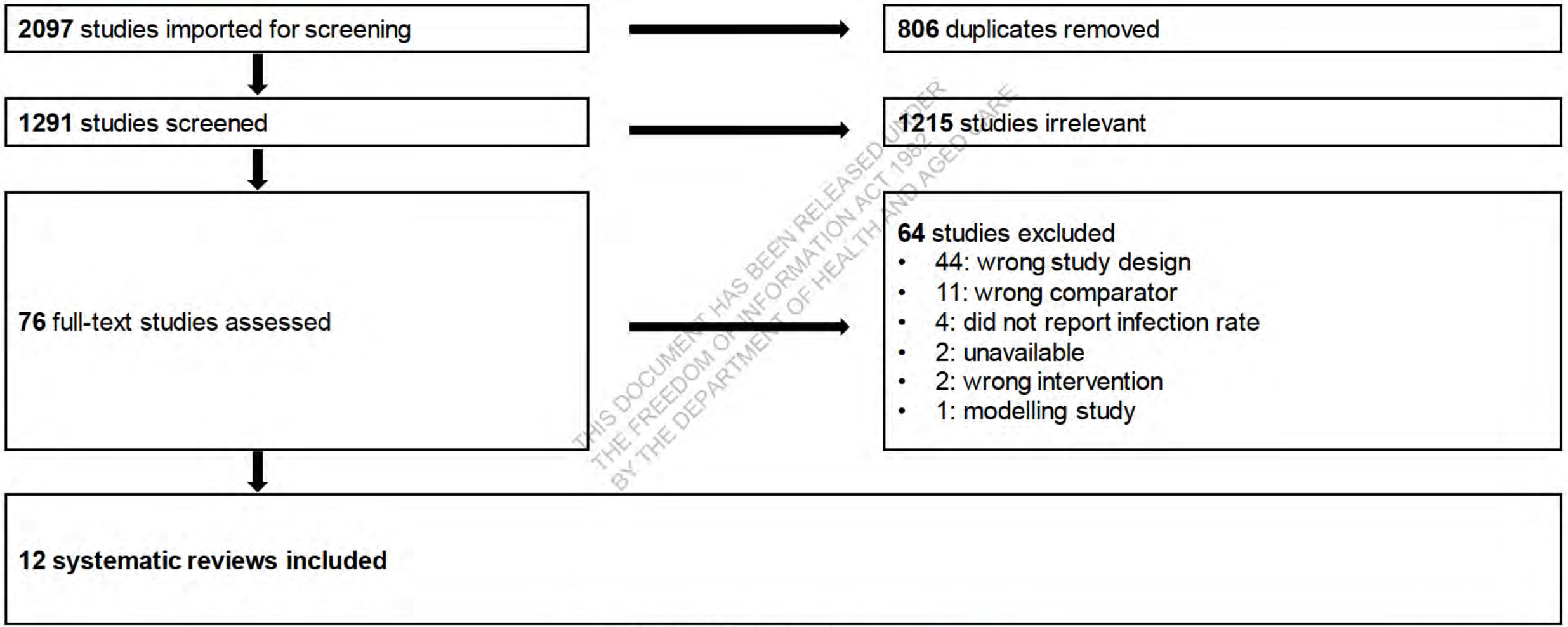
What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 infection in HCWs and the general population? [review of reviews]

Results



What is the comparative efficacy of respirators (e.g. N95, P2, PFR) and surgical masks in preventing SARS-CoV-2 infection in HCWs and the general population? [review of reviews]

SEARCH RESULTS



What is the comparative efficacy of respirators (e.g. N95, P2, PFR) and surgical masks in preventing SARS-CoV-2 infection in HCWs and the general population? [review of reviews]

UPDATE SEARCH CONDUCTED MAY 18 2022

SEARCH RESULTS

475 studies imported for screening → **351** duplicates removed

124 studies screened → **115** studies irrelevant

9 full-text studies assessed → **8** studies excluded
- 7: wrong study design
- 1: did not compare respirators to surgical mask

1 living systematic review update included

What is the comparative efficacy of respirators (e.g. N95, P2, PFR) and surgical masks in preventing SARS-CoV-2 infection in HCWs and the general population? [review of reviews]

KEY FINDINGS

- 13 systematic reviews (one living with 2 updates) published in 2020 (n=5), 2021 (n=6) and 2022 (n=2)
  - 8/13 = High quality, 5/13 = Low quality
  - All examined HCWs
  - 6/13 also examined the general population (one living with 2 updates)

HCWs (12 reviews):

- 6 reviews (6 = High quality) supported the use of N95 respirators to provide better protection for HCWs against SARS-CoV-2 compared to surgical masks.
- 7 reviews (5 = Low quality, 2 = High quality) could not conclude if N95s provided better protection for HCWs against SARS-CoV-2 transmission compared to surgical masks.

General population (6 reviews):

- All reviews (3 = High quality, 3 = Low quality) could not conclude if N95s provided better protection for the general public against SARS-CoV-2 transmission compared to surgical masks.

What is the comparative efficacy of respirators (e.g. N95, P2, PFR) and surgical masks in preventing SARS-CoV-2 infection in HCWs and the general population?

SYSTEMATIC REVIEWS (N = 13) ORDERED FROM HIGHEST TO LOWEST LEVEL OF CONFIDENCE IN FINDINGS

Citation	Quality Score (%)	Quality of included studies	HCWs – N95 or surgical mask for protection from SARS-CoV-2?	General population – N95 or surgical mask for protection from SARS-CoV-2?
Chu et al., 2020, Lancet	High 14/16 (88%)	Low to Moderate	N95	Both
Iannone et al., 2020, PLoS One	High 14/16 (88%)	Low to Moderate	N95	-
Kim et al., 2022, Rev Med Virol	High 14/16 (88%)	Very low to Moderate	N95	NC
Kunstler et al., 2022, Infect Dis Health	High 14/16 (88%)	Low	NC	-
Li et al., 2021a, Med	High 14/16 (88%)	Low to Moderate	N95	-
Collins et al., 2021, J Am Coll Emerg Physicians Open	High 13/16 (81%)	Moderate	N95	-
Griswold et al., 2021, J Trauma Acute Care Surg	High 12/16 (75%)	Moderate	N95	-
Li et al., 2021b, Ann Transl Med	High 10/16 (63%)	Very low to Moderate	NC	NC
Chou et al., 2020 (Update 6), Ann Intern Med	Low 8/16 (50%)	Low to Moderate	NC	NC
Chou et al., 2021 (Update 7), Ann Intern Med*	**Low 8/16 (50%)**	**Low to Moderate**	NC	NC
Ramaraj et al., 2020, BMJ Open	Low 8/16 (50%)	Very low to Moderate	NC	-
Ippolito et al., 2020, Pulmonology	Low 5/16 (31%)	Unclear / not reported	NC	-
Santarsiero et al., 2021, Ann Ig	Low 2/16 (13%)	Unclear / not reported	NC	NC

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***Identified in update search**

NC = No conclusion can be made due to insufficient evidence or no statistically significant differences calculated in meta-analyses

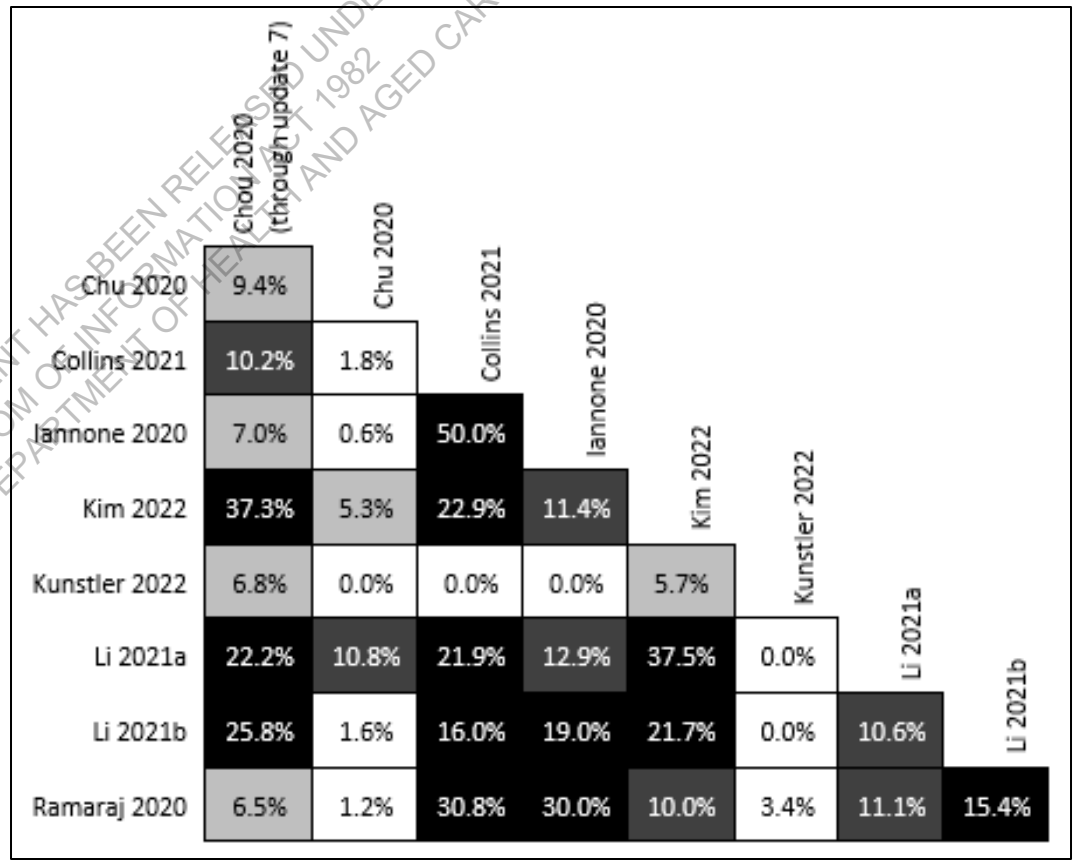
What is the comparative efficacy of respirators (e.g. N95, P2, PFR) and surgical masks in preventing SARS-CoV-2 infection in HCWs and the general population? [review of reviews]

OVERLAP BETWEEN SYSTEMATIC REVIEWS

- The GROOVE tool (Perez-Bracchigilone et al. 2022) was used to examine overlap of included studies between systematic reviews that clearly reported their yield. 10 / 13 reviews were included in this GROOVE analysis
- **Overall, the level of primary study overlap between the reviews was moderate. This should be considered when interpreting overall findings of this review**

Total number of studies = 237	
N (non-overlapping primary studies)	
In 1 SR	177
In 2 SRs	35
In 3 SRs	13
In 4 SRs	5
In 5 SRs	2
In 6 SRs	2
In 7 SRs	2
In 8 SRs	1

36	=	**Total nodes (pairs of reviews)**
10	=	No / Slight overlap (<5%)
6	=	Moderate overlap (5% to <10%)
7	=	High overlap (10% to <15%)
13	=	Very High overlap (≥15%)



Pérez-Bracchiglione J, Meza N, Bangdiwala SI, et al. Graphical Representation of Overlap for OVErviews: GROOVE tool. *Res Synth Methods*. 2022;13(3):381-388. doi:10.1002/jrsm.1557

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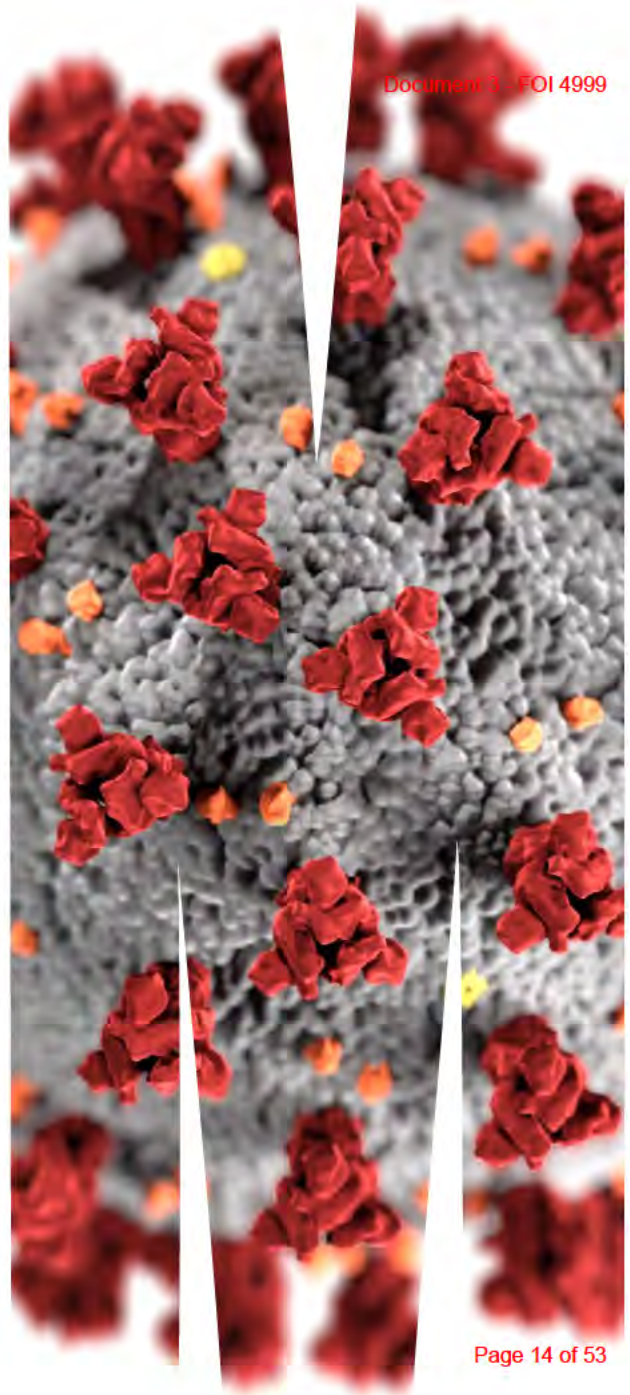
What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 infection in HCWs and the general population? [review of reviews]

Summaries of higher-quality systematic reviews



Chu, D. K., Akl, E. A., Duda, S., Solo, K., Yaacoub, S., Schünemann, H. J., ... & Reinap, M. (2020). Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis. *The Lancet*, *395*(10242), 1973-1987.

Tip! Click on the citation to link to the online version

Aim: Systematically review the effect of physical distance, face masks, and eye protection on transmission of SARS-CoV2, SARS-CoV-1, and MERS-CoV.

Number of included studies and search date: 172 studies (30 on mask vs respirator). Search completed 03 May 2020

HEALTHCARE WORKERS

Summary of findings: The use of both N95 or similar respirators or surgical or similar face masks by those exposed to infected individuals was associated with a large reduction in risk of betacoronavirus infection, with stronger associations in health-care settings (RR 0.30, 95% CI 0.22 to 0.41) compared with non-health-care settings. The association with protection from infection was more pronounced with N95 or similar respirators (aOR 0.04, 95% CI, 0.004 - 0.30) compared with other masks (aOR 0.33, 95% CI 0.17 - 0.61).

Conclusion: Both N95 and surgical masks have a stronger association with protection versus single-layer masks, although a stronger association of protection from COVID-19, SARS, or MERS was seen with N95 or similar respirators.

GENERAL POPULATION

Summary of findings: The use of both N95 or similar respirators or face masks (e.g., disposable surgical masks or similar reusable 12-16–layer cotton masks) by those exposed to infected individuals was associated with a large reduction in risk of infection in non-healthcare settings (RR 0.56, 95% CI 0.40 to 0.79).

Conclusion: Both N95 and surgical masks have a stronger association with protection versus single layer masks, although a stronger association of protection from COVID-19, SARS, or MERS was seen with N95 or similar respirators.

Iannone, P., Castellini, G., Coclite, D., Napoletano, A., Fauci, A. J., Iacorossi, L., ... & Gianola, S. (2020). The need of health policy perspective to protect Healthcare Workers during COVID-19 pandemic. A GRADE rapid review on the N95 respirators effectiveness. *PloS One*, *15*(6), e0234025.

HEALTHCARE WORKERS

Aim: Assess the efficacy of N95 respirators versus surgical masks for the prevention of respiratory tract infections transmission among HCWs.

Number of included studies and search date: 4 studies. Search completed 21 March, 2020

Summary of findings: No RCTs addressing the prevention of SARS-CoV-2 infection among HCWs were found. However, low quality evidence (according to GRADE) suggests that N95 respirators are better than surgical masks in protecting HCWs from clinical respiratory illness (2 RCTs, RR 0.43, 95% CI 0.29-0.64) with an absolute effect of preventing 73 more (95% CI 46-91) infections per 1000 HCWs. Very low quality evidence suggests a trend in favour of N95 over surgical masks for influenza-like-illness (4 RCTs; RR 0.72; 95% CI, 0.38 - 1.37), laboratory confirmed respiratory viral infections (3 RCTs; RR 0.84; 95% CI, 0.52 -1.34), and laboratory confirmed influenza (4 RCTs; RR 1.07; 95% CI, 0.83 - 1.39).

Conclusion: No direct high-quality evidence on whether N95 respirators are better than surgical masks in protecting HCWs from SARS-CoV-2 was found. However, low quality evidence suggests that N95 respirators are better than surgical masks in protecting HCWs from clinical respiratory illness and very low quality evidence suggest a trend in favour of N95 respirators in preventing influenza-like illness, laboratory confirmed respiratory viral infections and influenza like illness.

Kim, M. S., Seong, D., Li, H., Chung, S. K., Park, Y., Lee, M., ... & Smith, L. (2022). Comparative effectiveness of N95, surgical or medical, and non-medical facemasks in protection against respiratory virus infection: A systematic review and network meta-analysis. *Reviews in Medical Virology*, e2336.

Aim: Analyse comparative mask effects in various respiratory viral infections, including influenza, Middle East Respiratory Syndrome (MERS), Severe Acute Respiratory Syndrome (SARS) and COVID-19, in both community and healthcare settings.

Number of included studies and search date: 35 studies. Search completed 05 February, 2021

HEALTHCARE WORKERS

Summary of findings: In healthcare settings, the use of an N95 or equivalent mask was associated with a lower coronavirus (SARS, MERS, or COVID-19) infection rate (OR, 0.29; 95% CI, 0.19 - 0.44; p<0.001; GRADE, low), whereas the use of medical/surgical masks was not (OR, 0.69; 95% CI, 0.44 - 1.07; p=0.097; GRADE, very low). The results were consistent in subgroup analyses particularly limited to mask effectiveness during aerosol generating procedures (AGPs). High compliance to mask-wearing conferred significantly better protection (OR, 0.43; 95% CI, 0.23 - 0.82; GRADE, very low) than low compliance.

Conclusion: Our study confirmed that the use of facemasks provides protection against respiratory viral infections; however, the effectiveness may vary according to the type of facemask used. The N95 respirator or its equivalent was the most effective mask type, while evidence supporting the use of medical or surgical masks against influenza or coronavirus infections (SARS, MERS and COVID-19) was weak. Our findings encourage the use of N95 respirators or their equivalents (e.g., P2) for best personal protection in healthcare settings until more evidence is accrued.

GENERAL POPULATION

Summary of findings: Insufficient data were identified on the effectiveness of N95 or equivalent masks against coronavirus infection in community settings.

Conclusion: This study highlights a substantial lack of evidence on the comparative effectiveness of mask types in community settings.

HEALTHCARE WORKERS

Aim: Examine the differences in likelihood of SARS-CoV-2 infection and adverse events between HCWs using respirators and surgical masks.

Number of included studies and search date: 21 studies. Search completed 14 June, 2021

Summary of findings: A meta-analysis of 12 observational studies at high risk of bias found no statistically significant difference in respirator or surgical mask effectiveness in preventing SARS-CoV-2 infection (OR 0.85; 95%CI, 0.72 - 1.01). No high-quality epidemiological evidence was identified.

Conclusion: To date, insufficient high-quality epidemiological evidence exists to support healthcare workers (HCWs) using P2/N95 respirators instead of surgical masks to prevent SARS-CoV-2 infection. The existing epidemiological evidence is at high risk of bias and does not enable a definitive assessment of the effectiveness of respirators compared to surgical masks in preventing SARS-CoV-2 infection in HCWs.

Li, J., Qiu, Y., Zhang, Y., Gong, X., He, Y., Yue, P., ... & Li, Y. (2021a). Protective efficient comparisons among all kinds of respirators and masks for health-care workers against respiratory viruses: A PRISMA-compliant network meta-analysis. *Medicine*, *100*(34).

HEALTHCARE WORKERS

Aim: Assess and quantify protective effectiveness of N95 respirator vs medical mask against respiratory infectious viruses.

Number of included studies and search date: 32 studies. Search completed 10 November, 2020

Summary of findings: Network meta-analysis found that N95 respirators provided significantly stronger protection for HCWs against diseases caused by beta coronaviruses (SARS, MERS and COVID-19)(OR 0.43; 95% CI, 0.20-0.94). However, pooled effects from two separate meta-analyses of RCTs of common respiratory viruses and observational studies of pandemic H1N1 showed no significant difference between N95 respirators and medical masks against laboratory-confirmed respiratory virus infection (RR 0.99, 95% CI 0.86-1.13), clinical respiratory illness (RR 0.89, 95% CI 0.45-1.09), influenza-like illness (RR 0.75, 95% CI 0.54 - 1.05) and laboratory confirmed pandemic H1N1 (OR 0.92, 95% CI 0.49 - 1.70).

Conclusion: Our results provide moderate and very-low quality evidence of no significant difference between N95 respirators and medical masks for common respiratory viruses and pandemic H1N1, respectively. We found low quality evidence that N95 respirators had a stronger protective effectiveness for HCWs against diseases caused by betacoronaviruses compared to medical masks. The evidence of comparison between N95 respirators and medical masks for COVID-19 is open to question and needs further study.

Collins, A. P., Service, B. C., Gupta, S., Mubarak, N., Zeini, I. M., Osbahr, D. C., & Romeo, A. A. (2021). N95 respirator and surgical mask effectiveness against respiratory viral illnesses in the healthcare setting: A systematic review and meta-analysis. *Journal of the American College of Emergency Physicians Open*, *2*(5), e12582.

HEALTHCARE WORKERS

Aim: Analyze the data assessing N95 respirator use versus surgical mask use for the prevention of influenza and other viral respiratory illness.

Number of included studies and search date: 8 studies. Search completed 14 May, 2021

Summary of findings: Meta-analyses showed statistically significant differences between N95 respirator versus surgical mask use to prevent influenza-like-illness (RR 0.81; 95% CI, 0.68 – 0.94, $p<0.05$), non-influenza respiratory viral infection (RR 0.62; 95% CI, 0.52 – 0.74, $p<0.05$), respiratory viral infection (RR 0.73,;95% CI = 0.65–0.82, $p<0.05$), severe acute respiratory syndrome coronavirus (SARS-CoV) 1 and 2 virus infection (RR = 0.17, 95% CI = 0.06–0.49, $P < 0.05$), and laboratory-confirmed respiratory viral infection (RR = 0.75, 95% CI = 0.66–0.84, $P < 0.05$). Analyses did not indicate statistically significant results against laboratory-confirmed influenza (RR = 0.87, CI = 0.74–1.03, $P > 0.05$).

Conclusion: N95 respirator use was associated with fewer viral infectious episodes for healthcare workers compared with surgical masks. The N95 respirator was most effective in reducing the risk of a viral infection in the hospital setting from the SARS-CoV-1 and 2 viruses compared to the other viruses included in this investigation.

Griswold, D. P., Gempeler, A., Kolias, A., Hutchinson, P. J., & Rubiano, A. M. (2021). Personal protective equipment for reducing the risk of COVID-19 infection among health care workers involved in emergency trauma surgery during the pandemic: An umbrella review. *The Journal of Trauma and Acute Care Surgery*, *90*(4), e72–e80.

HEALTHCARE WORKERS

Aim: Inform recommendations for the rational use of PPE in emergency surgery staff, particularly in low-resource environments where PPE shortages and high costs are expected to hamper the safety of HCWs and affect the care of trauma patients.

Number of included studies and search date: 18 studies. Search completed 27 July, 2020

Summary of findings: Included studies consisted of 17 systematic reviews and 1 qualitative evidence synthesis. The available evidence was consistent to show that the use of N95 respirators and surgical masks is associated with a reduced risk of coronavirus-related respiratory illness compared with no mask use, with high certainty on this beneficial effect. In moderate- to high-risk environments, especially in aerosol-generating procedures, evidence suggests that N95 respirators are associated with a more significant reduction in risk of COVID-19 infection compared with surgical masks, an effect seen in observational COVID-19 studies and experimental viral respiratory illness studies. Low-quality evidence estimates from these studies suggest a relative reduction of 50% in the risk of contagion associated with N95 respirators compared with surgical masks

Conclusion: There is high certainty that the use of N95 respirators and surgical masks is associated with a reduced risk of COVID-19 when compared with no mask use. In moderate to high-risk environments, N95 respirators are associated with a further reduction in risk of COVID-19 infection compared with surgical masks.

Li, Y., Wei, Z., Zhang, J., Li, R., Li, H., Cao, L., ... & Yang, K. (2021b). Wearing masks to reduce the spread of respiratory viruses: a systematic evidence mapping. *Annals of Translational Medicine*, *9*(9).

Aim: Identify, describe, and organise currently available high-quality design evidence for mask use during the spread of respiratory viruses through an evidence mapping approach and identify gaps in evidence.

Number of included studies and search date: 30 studies. Search completed 09 April, 2020

Summary of findings: Four moderate quality systematic reviews and six RCTs that evaluated the effect of N95 respirators on the interruption or reduction of the spread of respiratory viruses compared to the effect of medical masks were identified. One of four systematic reviews and three of six RCTs indicated a benefit in using N95 respirators over surgical masks, the remaining three reviews and three RCTs suggested no effect (i.e. similar effects between N95 respirators and medical masks.

HEALTHCARE WORKERS

Conclusion: Overall, masks may be effective in interrupting or reducing the spread of respiratory viruses. However, the study conclusions on the effectiveness of N95 respirators over medical masks are contradictory, especially for HCWs.

GENERAL POPULATION

Conclusion: Overall, masks may be effective in interrupting or reducing the spread of respiratory viruses. However, high-quality design evidence for mask use by a special population (such as students and company employees) is rare, and this requires further research.

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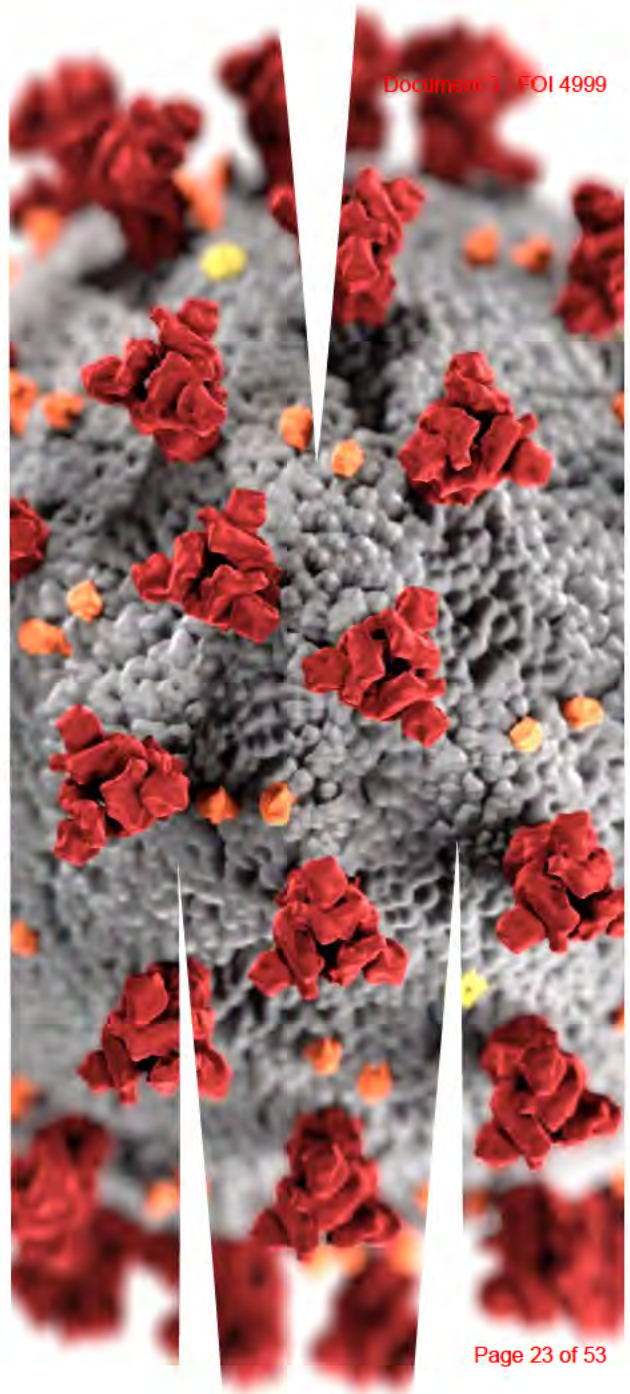
What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 infection in HCWs and the general population? [review of reviews]

Summaries of lower-quality systematic reviews



Chou R, Dana T, Jungbauer R. Update Alert 6: Masks for Prevention of Respiratory Virus Infections, Including SARS-CoV-2, in Health Care and Community Settings. *Ann Intern Med*. 2021;*174*(9):W68. doi:10.7326/L21-0393

Aim: To examine the effectiveness of N95, surgical, and cloth masks in community and health care settings for preventing respiratory virus infections, and effects of reuse or extended use of N95 masks using a living evidence review method.

Number of included studies and search date: 39 studies. Search is ongoing and was last updated 2 June, 2021 (#6).

HEALTHCARE WORKERS

Conclusion: The strength of evidence comparing N95 respirators with surgical masks for prevention of SARS-CoV-2 in health care settings is insufficient for conclusions to be made. Conclusions remain unchanged in update 6.

GENERAL POPULATION

Conclusion: The strength of evidence comparing N95 respirators with surgical masks for prevention of SARS-CoV-2 in community settings is non-existent. Conclusions remain unchanged in update 6 from the original publication.

Ramaraj, P., Super, J., Doyle, R., Aylwin, C., & Hettiaratchy, S. (2020). Triaging of respiratory protective equipment on the assumed risk of SARS-CoV-2 aerosol exposure in patient-facing healthcare workers delivering secondary care: a rapid review. *BMJ Open*, *10*(10), e040321.

HEALTHCARE WORKERS

Aim: Determine the evidence base to the protective ability of respirators versus fluid-repellant surgical masks to aerosolised SARS-CoV-2

Number of included studies and search date: 9 studies. Search date not reported (manuscript submitted for publication 14 May, 2020)

Conclusion: No statistically significant evidence was found to support the conjecture that a fluid-resistant surgical mask might provide the same level of protection as a respirator against SARS-CoV2, or indeed any tested live virus or inert submicron particle. Therefore, use of a respirator would be the more cautious option. There is a paucity of evidence on the comparison of facemasks and respirators specific to SARS-CoV-2, and poor-quality evidence in other contexts.

Ippolito, M., Vitale, F., Accurso, G., Iozzo, P., Gregoretti, C., Giarratano, A., & Cortegiani, A. (2020). Medical masks and Respirators for the Protection of Healthcare Workers from SARS-CoV-2 and other viruses. *Pulmonology*, *26*(4), 204-212.

HEALTHCARE WORKERS

Aim: Summarise the available evidence on the use of medical masks and respirators in the context of viral infections, with a specific focus on COVID-19.

Number of included studies and search date: Number of studies not reported. Search completed 03 April, 2020

Conclusion: Clinical evidence on the use of filtering facepiece respirators (FFR) is poor. Direct evidence on the effectiveness of FFR in the prevention of SARS-CoV-2 infection is low and still underway, with concerns about the generalisability of other virus models.

Santarsiero, A., Giustini, M., Quadrini, F., D'Alessandro, D., & Fara, G. M. (2021). Effectiveness of face masks for the population. *Ann Ig*, *33*(4), 347-359.

HEALTHCARE WORKERS

Aim: Assess the effectiveness of commercial and homemade fabric/cloth masks by examining the statistical results from relevant scientific literature; to assess factors concerning the choice of materials and related layers in the manufacturing of commercial fabric/cloth masks, which may help both manufacturers and health authorities in assessing their efficiency and effectiveness

Number of included studies and search date: Unclear number of studies. Search completed 15 July, 2020

Conclusion: Only references the Chu et al., 2020, review that we have included. Authors conclude that surgical masks and N95s are both effective in minimizing SARS-CoV-2 transmission, especially in HCWs with minimal evidence conducted using the general population possibly due to resource constraints.

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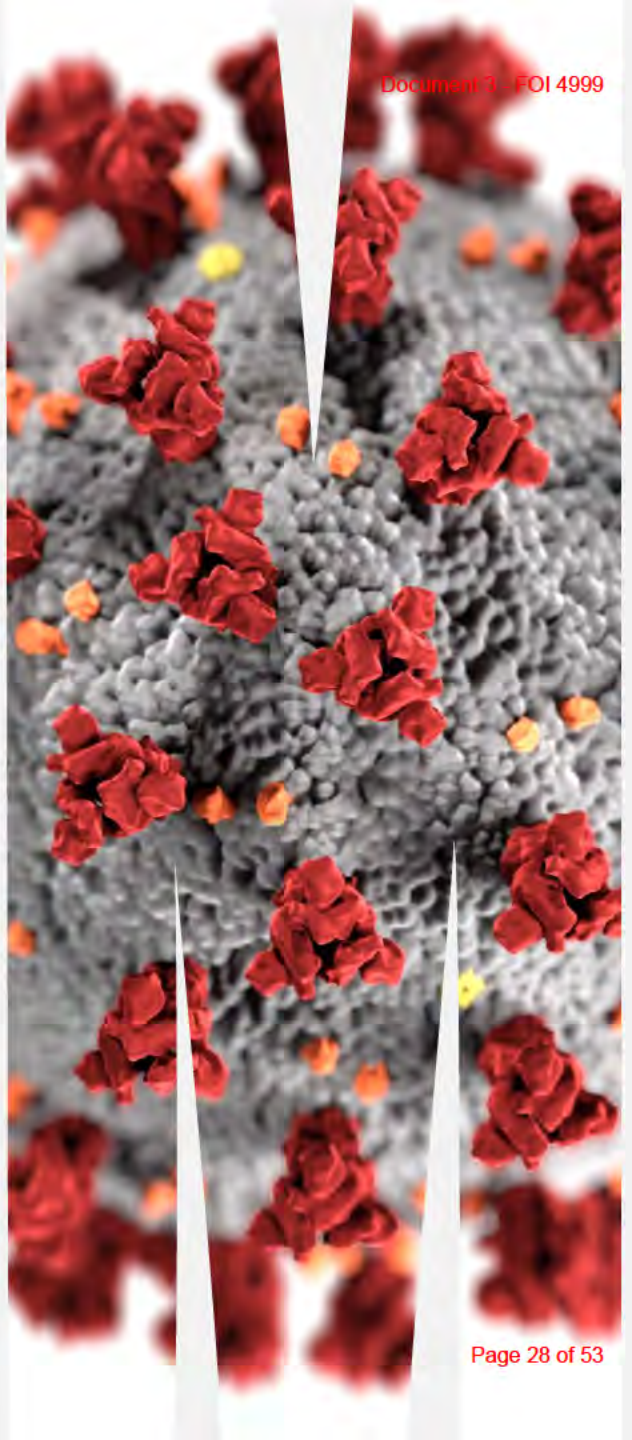
What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 infection in HCWs and the general population? [review of reviews]

New evidence from the update search



Chou, R., Dana, T., & Jungbauer, R. (2020). Update Alert 7: Masks for Prevention of Respiratory Virus Infections, Including SARS-CoV-2, in Health Care and Community Settings. *Annals of Internal Medicine*, *175*(5), W58-W59.

Aim: Examine the effectiveness of N95, surgical, and cloth masks in community and health care settings for preventing respiratory virus infections, and effects of reuse or extended use of N95 masks using a living evidence review method. ***The findings outlined below are for the most recent update (Update #7) published in May, 2022, which covered the period June 3 – Dec 2 2021***

HEALTHCARE WORKERS

Summary of findings: One new cohort study (Haller et al. 2021, *identified as a pre-print in reviews included in our original review*) found that HCWs who primarily used FFP2 (N95 equivalent) masks had decreased risk for SARS-CoV-2 infection (adjusted hazard ratio, 0.80 [CI, 0.64 to 1.00]) or seroconversion (adjusted odds ratio, 0.73 [CI, 0.53 to 1.00]) versus HCWs who primarily used surgical masks. In a stratified analysis, the reduction in risk among mostly FFP2 mask users was statistically significant among HCWs with frequent (>20) contacts with patients with COVID-19 (adjusted hazard ratios, 0.66 [CI, 0.54 to 0.81] for SARS-CoV-2 positive polymerase chain reaction and 0.64 [CI, 0.42 to 0.97] for seroconversion). Most data for this study occurred prior to the Delta variant and was not peer-reviewed at time of the review publication.

Conclusion: The quality of the included studies remains low for Update 7 as they have been for previous updates. Strength of evidence comparing N95 respirators with surgical masks for HCWs remains insufficient because of methodological limitations, imprecision, and inconsistency across studies. No change in conclusions in Update 7 compared to previous updates.

GENERAL POPULATION

Number of included studies and search date: New evidence (1 large cluster RCT, n > 340,000, Bangladesh) slightly strengthened the evidence of benefit of masks versus no masks in community settings from low to low–moderate. However, the conclusions of the specific comparison of N95 vs. surgical masks remain unchanged.

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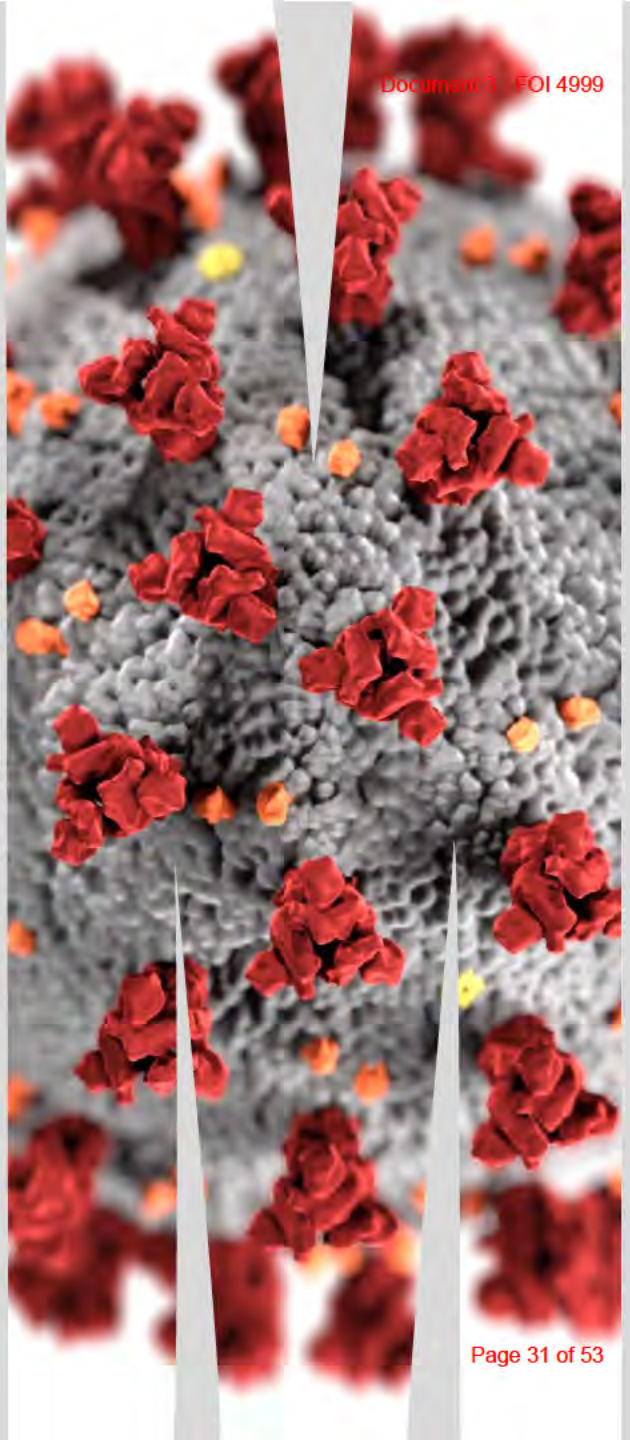
Review 5: What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 / influenza infection in HCWs and the general population? [review of primary studies]



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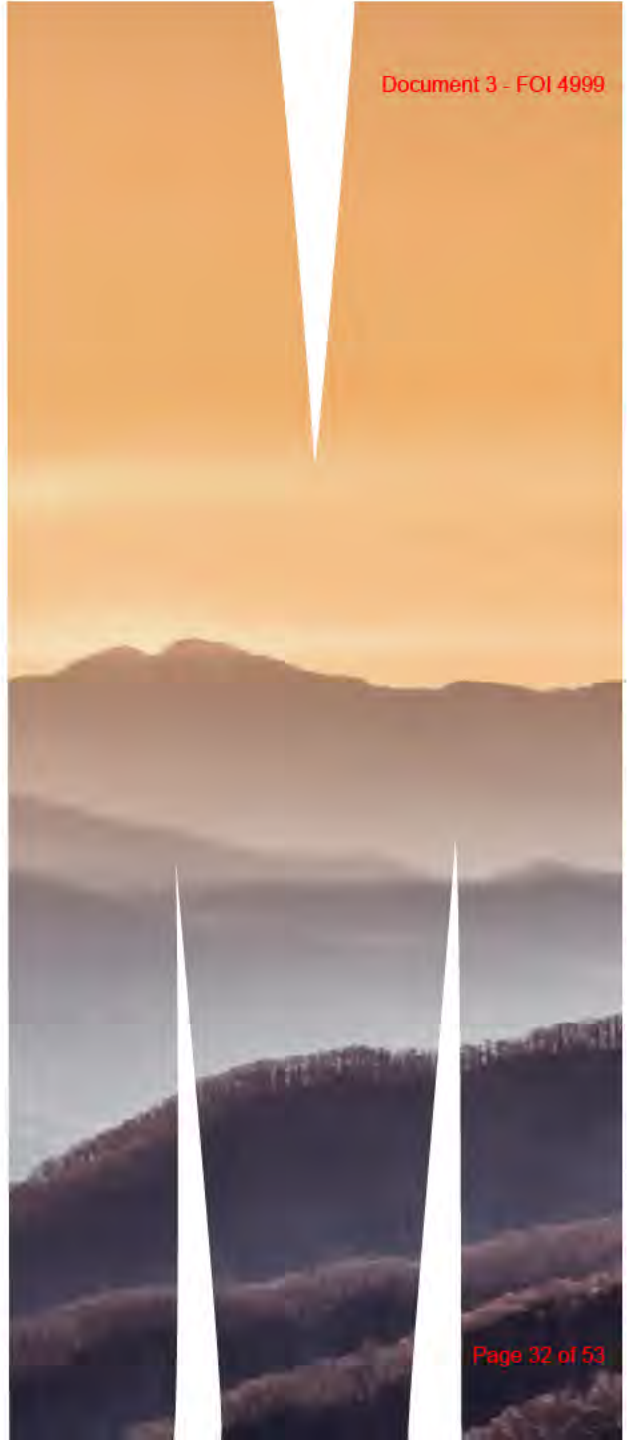
RAPID REVIEWS OF SARS-COV-2 TOPICS FOR INFECTION PREVENTION AND CONTROL GUIDANCE DEVELOPMENT

FINDINGS OF RAPID EVIDENCE REVIEW 5:

What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 / influenza infection in HCWs and the general population? [review of primary studies]



JUNE 10, 2022

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This PowerPoint presentation represents the work conducted by Dr Paul Kellner, Dr Brea Kunstler, Associate Professor Peter Bragge, Dr Sarah McGuinness, Professor Karin Leder, Ms Veronica Delafosse and Ms Diki Tsering.

Declarations of Conflict of Interest

The authors have no conflicts to declare.

Citation: Kunstler, B., McGuinness, S., Kellner, P., Delafosse, V., Tsering, D. & Bragge, P, & Leder, K. (2022). What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 / influenza infection in HCWs and the general population? [review of primary studies] [PowerPoint slides]. BehaviourWorks Australia, Monash University.

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INTRODUCTION

The COVID-19 pandemic has increased awareness of the importance of personal protective equipment (PPE) in preventing SARS-CoV-2 infection in the general public and in the healthcare workers (HCWs) who treat them.

Following a **review of reviews,** this rapid evidence review addressed the question:

- What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 / influenza in HCWs and the general population? [review of primary studies]

Every effort was made to ensure all relevant literature was captured and used to inform the findings presented in this presentation.

IMPORTANT CONSIDERATIONS FOR INTERPRETING THE RESULTS OF THIS REVIEW

1. The **date of the literature search** of the review (and any reviews contained within it), and whether the review is 'living' (continuously updated) will indicate how much recent research may not have been captured

2. **Pre-prints (if included) have not been subject to peer-review**

3. **Review parameters are adjusted to meet to timelines** (Speckemeier et al. 2022), and therefore some relevant literature may not be captured. Parameters include:
   - Adjusting the year range of the search: ***this review focused on publications from 2012 – 2022***
   - Focusing on specific study designs (usually review-level evidence): ***this review focused on primary studies***
   - Adjusting target interventions or phenomena (e.g., viruses vs. focus exclusively on SARS-CoV-2): ***this reviewed focused on SARS-CoV-2 and influenza viruses***
   - Limiting outcome measure type (e.g., PCR vs culture): ***this review focused on laboratory-confirmed infections (diagnosed via PCR or serology)***

4. **Covariates** that are unaccounted for within individual studies and / or reviews can under- or overestimate findings.

Speckemeier C, Niemann A, Wasem J, Buchberger B, Neusser S. Methodological guidance for rapid reviews in healthcare: A scoping review. *Res Synth Methods*. 2022;(May 2021):1-11. doi:10.1002/jrsm.1555

What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 / influenza infection in HCWs and the general population? [review of primary studies]

METHODS

Databases*	• Cochrane Central Register of Controlled Trials <Dec 2021 to April 2022*> • Ovid MEDLINE(R) ALL <Dec 01, 2021 to May 20, 2022> • Embase Classic+Embase <Dec 01, 2021 to May 20, 2022>
Inclusion criteria	• **Study type:** Comparative primary studies published since the most recent search in the review of reviews (Dec 1 2021) **OR** not included in the reviews identified and synthesised in review 1 • **Population/Surfaces:** Healthcare and non-healthcare settings • **Intervention:** P2/N95 and equivalent respirators • **Comparison:** Surgical masks • **Outcome:** Infection with SARS-CoV-2 or influenza (measured using PCR or serology) • **Year range:** 2012 onwards
Screening	• Citation / abstract screening was undertaken by one researchers • Full text screening was undertaken by two researchers
Quality appraisal	Primary studies appraised using a purposefully designed tool drawing on the Critical Appraisal Skills Program (CASP) checklists for qualitative, case control and cohort studies by one researcher • 'High quality' defined as >50% of applicable criteria met • 'Low quality' defined as ≤ 50% of applicable criteria met
Data extraction	• Data extraction was undertaken by one researcher and checked by another

*Cochrane Central is updated monthly, therefore the search on May 20 covered to the end of April 2022; CASP Checklists. https://casp-uk.net/casp-tools-checklists/ Accessed June 7, 2022

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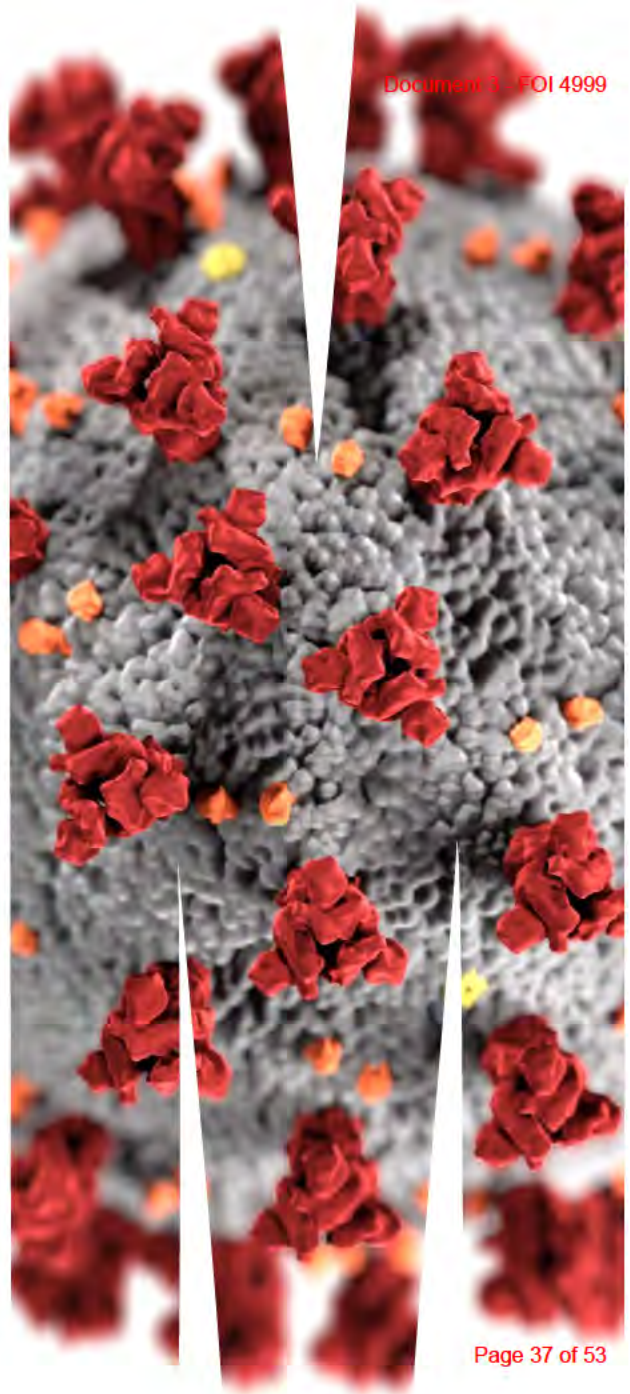
What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 / influenza infection in HCWs and the general population? [review of primary studies]

Results



What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 / influenza infection in HCWs and the general population? [review of primary studies]

SEARCH RESULTS

820 studies imported for screening → **237** duplicates removed

583 studies screened → **563** studies irrelevant

20 full-text studies assessed → **12** studies excluded
- 6: Doesn't compare respirators to surgical or cloth mask
- 3: Protocol
- 1: Doesn't report infection rate
- 1: Wrong study design
- 1: Modelling study

8 studies included

What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 / influenza infection in HCWs and the general population? [review of primary studies]

KEY FINDINGS

Based on 8 primary studies not included in any of the systematic reviews from the 'review of reviews' for this question:

Health care workers (7 studies)

- 3 out of 4 higher quality studies (all cross-sectional surveys) all concluded that FFP2/(K)N95 masks were superior to surgical masks for reducing risk of SARS-CoV-2 transmission in healthcare settings
- 1 higher quality pragmatic cluster-RCT (n=2,862) did not find a statistically significant difference in N95 vs. medical masks for influenza
- 3 lower quality studies found surgical mask wearing significantly lower in positive vs. negative cases (n=1497, prospective cohort); FFP2 masks reduced risk of SARS-CoV-2 (n=83, cross-sectional survey); and no difference between surgical masks vs. respirators (e.g. N95 / powdered air-purifying / controlled air purifying respirator) for positive SARS-CoV-2 test in postexposure quarantine (n=345, retrospective cohort)
- **In conclusion, FFP2/(K)N95 masks are superior to surgical masks for reducing risk of SARS-CoV-2 transmission in healthcare workers. Surgical masks offer more protection than no mask and may be equally effective in protecting against influenza.**

General population (2 studies)

- One higher quality primary study (n=1,828, case-control) found reduced of odds of SARS-CoV2 for any mask vs. none, with N95 lower odds (OR 0.17 - SIG) than surgical (0.34 - SIG) or cloth (0.44 – NS)
- One higher quality primary study (n=3,726, cross-sectional survey) reported FFP2/(K)N95 mask-wearers were significantly less likely to report SARS-CoV-2 than those using a surgical or cloth mask)
- **In conclusion, FFP2/(K)N95 appear superior to surgical masks for reducing risk of SARS-CoV-2 transmission in the general population, however the volume of evidence compared to that in healthcare workers is low**

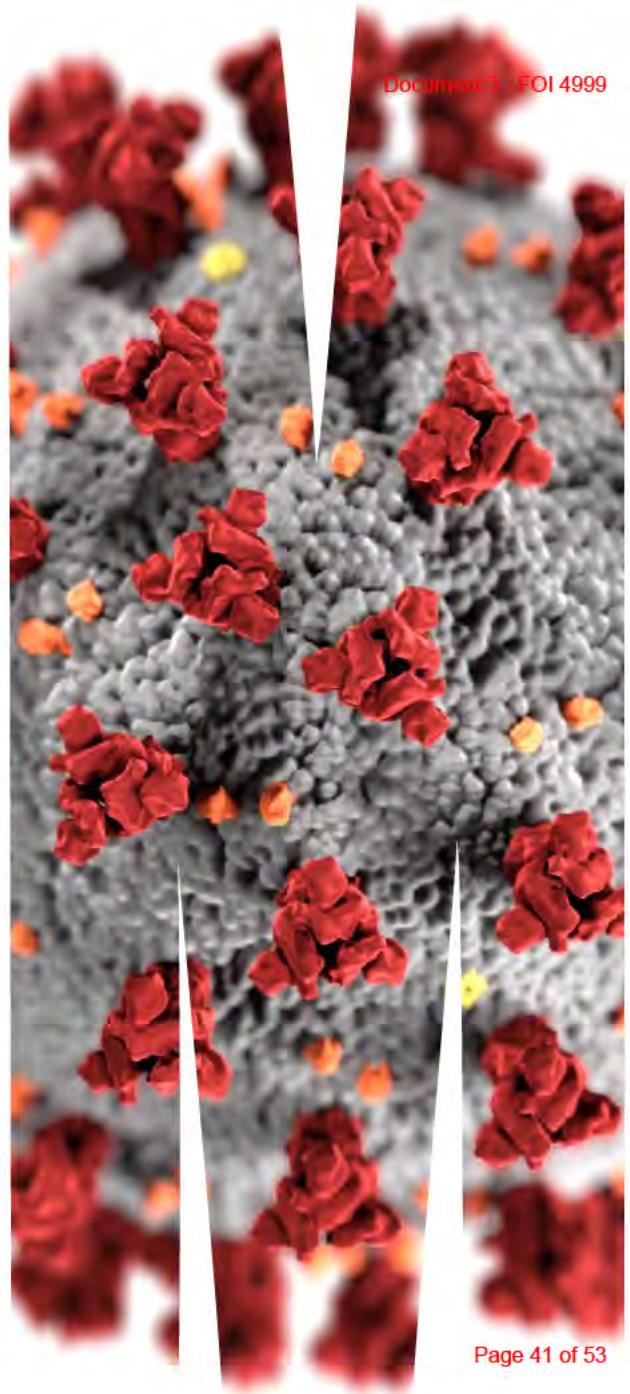
What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 / influenza infection in HCWs and the general population? [review of primary studies]

PRIMARY STUDIES ORDERED FROM HIGHEST-LOWEST LEVEL OF CONFIDENCE IN FINDINGS (N = 9)

Citation	Quality score	Study design	n (HCWs)	n (gen pop)	Key findings
Andrejko, 2022, MMWR	9/14	Case-control	X	1,828	Odds of SARS-CoV-2 lower any face mask vs. none (aOR = 0.44; 95% CI 0.24-0.82); n95 vs none (0.17, 0.05–0.64); surgical mask vs. none (0.34, 0.13–0.90); cloth mask vs. none (0.44, 0.17–1.17)
Radonovich, 2019, JAMA	9/14	Pragmatic cRCT	2,862	X	No significant difference in incidence of laboratory-confirmed influenza in HCWs randomised to wear N95 respirator vs. medical masks (aOR 1.18; 95% CI, 0.95-1.45)
Diakonoff, 2021, PLoS One	8/14	Cross-sectional survey	3497	X	Multivariate analysis showed that wearing a surgical mask (rather than FFP2/(K)N95 mask) during non-aerosol generating procedures was a specific risk indicator of COVID-19 (OR 1.88; 95% CI 1.30-2.73, p=0.008).
Mouliou, 2022, J Personalized Med	8/14	Cross-sectional survey	353	3726	FFP/(K)N95 mask-wearing respondents were significantly less likely to report a history of SARS-CoV-2 than those who used a single medical/surgical mask (p<0.001) or cloth mask (p=0.006).
Oksanen, 2021, Int J Occ Med Environ Health	8/14	Cross-sectional survey	866	X	All occupational infections originating from patients occurred while using a surgical mask or no mask at all. No occupational infections were found while wearing a FFP2/3 respirator and following aerosol precautions
Mihai, 2021, Int J Environ Res Pub Health	7/14	Cross-sectional survey	83	X	The use of FFP2 masks was found to reduce the risk of SARS-CoV-2 infection during medical and paramedical procedures (p=0.016)
Velay, 2022, Infect Dis Now	7/14	Prospective cohort	1497	X	Systematic adherence to strict hygiene standards was similar between seropositive and seronegative subjects, except for the systematic use of a surgical mask, which was less frequently reported by seropositive subjects than seronegative subjects (OR: 1.9; 95% CI: 1.3–2.8, p=0.0007)
Shah, 2021, Infect Control Hosp Epidemiol	5/14	Retrospective cohort	345	X	The use of a surgical face mask instead of a respirator during an AGP was not associated with testing positive for SARS-CoV-2 during the postexposure quarantine period (RR, 0.99; 95% CI, 0.96–1, p=1)

What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 / influenza infection in HCWs and the general population? [review of primary studies]

Summary of higher-quality primary studies



Andrejko, K. L., Pry, J. M., Myers, J. F., Fukui, N., DeGuzman, J. L., Openshaw, J., ... & Case-Control Study Team. (2022). Effectiveness of face mask or respirator use in indoor public settings for prevention of SARS-CoV-2 infection—California, February–December 2021. *Morbidity and Mortality Weekly Report*, *71*(6), 212.

Tip! Click on the citation to link to the online version

Aim: To assess the real-world effectiveness of face masks and respirators in preventing acquisition of SARS-CoV-2 infection

Population (country): General population (USA)

Study design (participant number): Case-control study (cases=652, control= 1,176)

PPE examined: Respirator (N95 or equivalent); Surgical / medical mask; Cloth / fabric mask

Primary outcome: Laboratory-confirmed SARS-CoV-2 infection (detected by molecular methods)

Study period: 18 February, 2021 to 1 December, 2021

Risk of bias (quality): 9/14 (High quality / low risk of bias)

Summary of findings: The primary analysis compared self-reported face mask or respiratory use in indoor public settings 14 days before SARS-CoV-2 testing between case and control participants. An additional analysis assessed differences in protection against SARS-CoV-2 infection by the type of face covering worn and was limited to a subset of participants enrolled after 9 September 2021 (n=534). Data were collected from a telephone survey of a random sample of California residents with a positive molecular SARS-CoV-2 test result. Consistent use of any face mask or respirator in indoor public settings was associated with lower odds of a positive SARS-CoV-2 test result compared with not wearing a mask (aOR = 0.44; 95% CI 0.24-0.82). The adjusted odds of infection were lowest among persons who reported typically wearing an N95/KN95 respirator (aOR = 0.17; 95% CI = 0.05–0.64), followed by those typically wearing a surgical mask (aOR = 0.34; 95% CI = 0.13–0.90). Wearing a cloth mask (aOR = 0.44; 95% CI = 0.17–1.17) was associated with lower adjusted odds of a positive test compared with never wearing a face covering but was not statistically significant.

Conclusion: Use of respirators with higher filtration capacity was associated with the most protection from SARS-CoV-2 infection, compared with no mask use, although it is most important to wear a well-fitting mask or respirator that is comfortable and can be used consistently. Consistent use of a face mask or respirator in indoor public settings was associated with lower odds of a positive SARS-CoV-2 test result.

Radonovich, L. J., Simberkoff, M. S., Bessesen, M. T., Brown, A. C., Cummings, D. A., Gaydos, C. A., ... & Perl, T. M. (2019). N95 respirators vs medical masks for preventing influenza among health care personnel: a randomized clinical trial. *Jama*, *322*(9), 824-833.

Aim: Compare the effect of N95 respirators vs medical masks for the prevention of influenza and other viral respiratory infections among health care personnel (HCP).

Population (country): HCWs (USA)

Study design (participant number): Cluster randomised pragmatic effectiveness trial (n=2,862 participants; 1416 participated for >1 year or intervention period)

PPE examined: Respirator (N95 or equivalent); Surgical / medical mask

Primary outcome: Laboratory-confirmed influenza infection (PCR or serology)

Study period: September 2011 to May 2015 with a final follow-up on 28 June, 2016

Risk of bias (quality): 9/14 (High quality / low risk of bias)

Summary of findings: Each year for 4 years, during the 12-week period of peak viral respiratory illness, pairs of outpatient sites (clusters) within US medical centres were matched and randomly assigned to N95 respiratory or medical mask groups. Overall, 1993 participants in 189 clusters were randomly assigned to wear N95 respirators and 2058 in 191 clusters were randomly assigned to wear medical masks when near patients with respiratory illness. There were 207 laboratory-confirmed influenza infection events (8.2% of HCW-seasons) in the N95 respirator group and 193 (7.2% of HCW-seasons) in the medical mask group (difference, 1.0%, [95% CI, −0.5% to 2.5%]; P = .18) (adjusted odds ratio [OR], 1.18 [95% CI, 0.95-1.45]). There were no significant differences between N95 respirators or medical masks in the rates of acute respiratory illness (difference, −21.9 per 1000 HCP-seasons [95% CI, −48.2 to 4.4]; P = .10); laboratory-detected respiratory infections (difference, −8.9 per 1000 HCP-seasons, [95% CI, −33.3 to 15.4]; P = .47); laboratory-confirmed respiratory illness events (difference, −8.6 per 1000 HCP-seasons [95% CI, −28.2 to 10.9]; P = .39); or influenza like illness events(difference, −11.3 per 1000 HCP-seasons [95% CI, −23.8 to 1.3]; P = .08). In the respirator group, 89.4% of participants reported “always” or “sometimes” wearing their assigned devices vs 90.2% in the mask group

Conclusion: In this pragmatic, cluster randomized trial that involved multiple outpatient healthcare sites and spanned 4 seasons of peak viral respiratory illness, there was no significant difference between the effectiveness of N95 respirators and medical masks in preventing laboratory-confirmed influenza among HCWs routinely exposed to respiratory illnesses in the workplace. In addition, there were no significant differences between N95 respirators and medical masks in the rates of acute respiratory illness, laboratory-detected respiratory infections, laboratory-confirmed respiratory illness, and influenza-like illness among participants.

Diakonoff, H., Jungo, S., Moreau, N., Mazevet, M. E., Ejeil, A. L., Salmon, B., & Smaïl-Faugeron, V. (2021). Application of recommended preventive measures against COVID-19 could help mitigate the risk of SARS-CoV-2 infection during dental practice: Results from a follow-up survey of French dentists. *PloS One*, *16*(12), e0261439

Aim: To survey French dentists after the first French lockdown to report the prevalence of COVID-19, assess the impact of preventive measures implemented following the end of the lockdown, and to identify risk indicators associated with COVID-19.

Population (country): HCWs (France)

Study design (participant number): Cross-sectional survey (n=3,497)

PPE examined: Respirator (N95 or equivalent); Surgical / medical mask

Primary outcome: Self-reported history of positive SARS-CoV-2 test (PCR or serology)

Study period: July 2020 to September 2020

Risk of bias (quality): 8/14 (High quality / low risk of bias)

Summary of findings: Amongst 3497 survey respondents, 126 (3.6%) reported a positive test for SARS-CoV-2. Univariate and multivariate logistic regression analyses were performed to explore risk indicators for SARS-CoV-2 infection (by comparing SARS-CoV-2 positive vs. SARS-CoV-2 negative or non-tested cases). In univariate analysis, odds of SARS-CoV-2 infection were lower in dentists who reported wearing FFP2/FFP3/(K)N95 masks during aerosol (0.47; 95% CI 0.26–0.84, p = 0.010) or non-aerosol generating procedures (0.51; 95% CI 0.36–0.73, p<0.001) and higher in dentists who reported wearing surgical masks during aerosol (1.70; 95% CI 1.15–2.52, p = 0.008) or non-aerosol generating procedures (1.89; 95% CI 1.32–2.69, p<0.001). Multivariate analysis showed that wearing a surgical mask during non-aerosol generating procedures was a specific risk indicator of COVID-19 (OR 1.88; 95% CI 1.30-2.73, p=0.008).

Conclusion: Although dentists had a similar prevalence of COVID-19 infection as compared to the general population, our results suggest that they could be overexposed to COVID-19 without the implementation of specific preventive measures. During aerosol or non-aerosol generating procedures, odds of COVID-19 were higher in dentists who wore surgical masks but were lower in dentists treating fewer patients and wearing FFP2, FFP3 or (K)N95 masks. Dentists should reduce the number of patients to allow proper implementation of disinfection and ventilation procedures and wear specific PPE (FFP2, FFP3 or (K)N95 masks) including during non-aerosol generating procedures.

Mouliou, D. S., Pantazopoulos, I., & Gourgoulianis, K. I. (2022). Medical/Surgical, Cloth and FFP/(K) N95 Masks: Unmasking Preference, SARS-CoV-2 Transmissibility and Respiratory Side Effects. *Journal of Personalized Medicine*, *12*(3), 325.

Aim: Present the mask type preferences amongst tertiary sector services and to monitor SARS-CoV-2 transmissibility in the wearing of specific mask types.

Population (country): General population and HCWs (Greece)

Study design (participant number): Cross-sectional survey (n=4,107)

PPE examined: Respirator (N95 or equivalent); Surgical / medical mask; Cloth / fabric mask

Primary outcome: Self-reported history of SARS-CoV-2 infection (further details not stated)

Study period: 18 November, 2021 to 27 November, 2021

Risk of bias (quality): 8/14 (High quality / low risk of bias)

Summary of findings: Of 4107 survey respondents, 381 were HCWs and 3726 were from other tertiary sector services. Amongst 3300 respondents reporting frequent mask-wearing (daily for at least 3h), 475 (14.4%) reported a history of SARS-CoV-2 infection. SARS-CoV-2 infection was less commonly reported amongst frequent mask wearers who used FFP/(K)N95 masks compared to those who used a single medical/surgical mask (9.2% vs. 15.6%, $p < 0.001$) or those who used cloth masks (9.2% vs. 14.4%, $p = 0.006$). There was no significant difference in frequency of SARS-CoV-2 infection between frequent mask wearers who used FFP/(K)N95 masks compared to those who double-masked with two medical/surgical masks (9.2% vs. 11.9%, $p = 0.378$).

Conclusion: Overall, FFP/(K)N95 mask-wearing respondents were less likely to report a history of SARS-CoV-2 than those who used a single medical/surgical mask or cloth mask.

Oksanen, L. M. A., Sanmark, E., Oksanen, S. A., Anttila, V. J., Paterno, J. J., Lappalainen, M., ... & Geneid, A. (2021). SOURCES OF HEALTHCARE WORKERS'COVID-19 INFECTIONS AND RELATED SAFETY GUIDELINES. International Journal of Occupational Medicine and Environmental Health.

Aim: Evaluate the effectiveness of safety guidelines in the workplace, the authors analyzed the work-related exposure to SARS-CoV-2 and the source of COVID-19 infections among healthcare workers (HCWs), together with the use of personal protective equipment (PPE).

Population (country): HCWs (Finland)

Study design (participant number): Cross-sectional survey (n=866)

PPE examined: Respirator (N95 or equivalent); Surgical / medical mask

Primary outcome: Laboratory-confirmed SARS-CoV-2 infection (PCR or serology)

Study period: Start date not stated, ended on 15 July, 2020

Risk of bias (quality): 8/14 (High quality / low risk of bias)

Summary of findings: Amongst 866 HCW participants, 41 (4.7%) were infected with SARS-CoV-2. All infected participants were contacted and their test results and answers regarding contact tracing, infectious contacts and the use of PPE were confirmed. Amongst those infected, 22 (53.6%) were deemed to have occupationally acquired infections (confirmed or likely). All occupational infections originating from patients occurred while using a surgical mask or no mask at all. No occupational infections were found while wearing a FFP2/3 respirator and following aerosol precautions (including wearing gloves, a long-sleeved fluid repellent gown, hair protection and eye protection), even amongst ICU HCWs who spent their whole shift in the same room with COVID-19 patients.

Conclusion: In this study, especially in the wards with high exposure, the surgical mask did not seem to provide enough protection against COVID-19. The use of FFP2/3 respirators in all patient contacts with confirmed or suspected COVID-19 patients is recommended.

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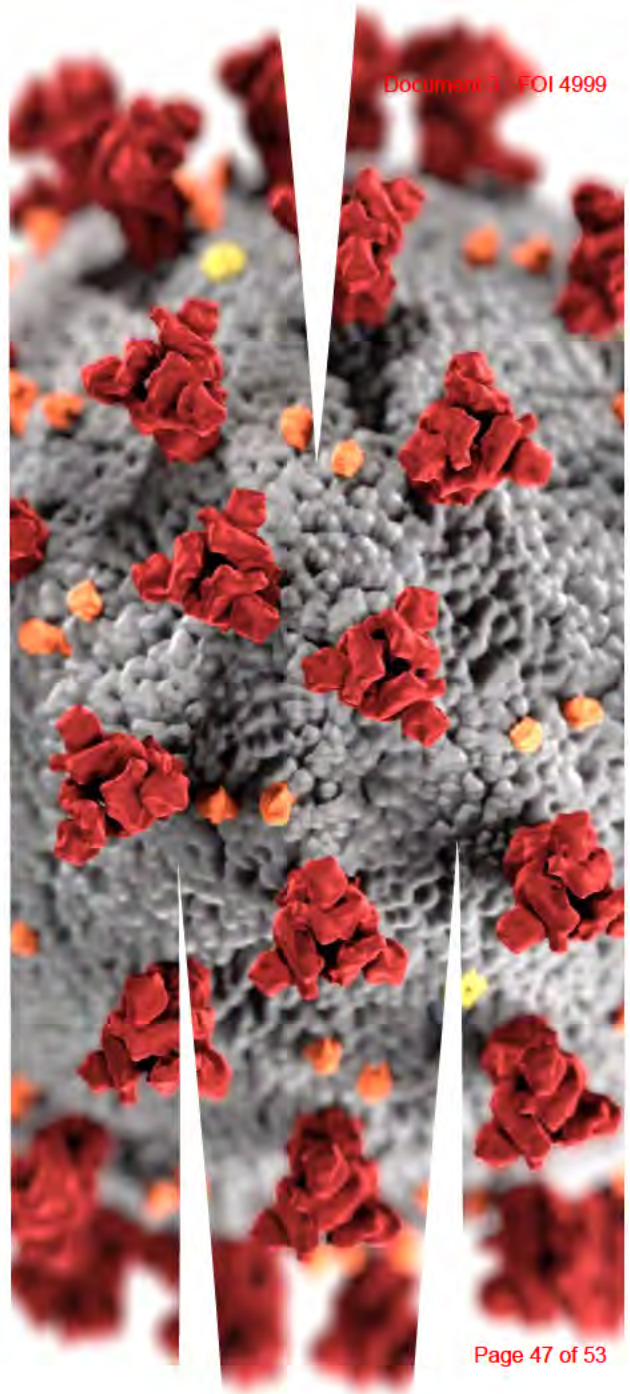
What is the comparative efficacy of surgical masks and N95 respirators in preventing SARS-CoV-2 / influenza infection in HCWs and the general population? [review of primary studies]

Summary of lower-quality primary studies



Mihai, A. M., Barben, J., Dipanda, M., Vovelle, J., Nuss, V., Baudin-Senegas, C., ... & Manckoundia, P. (2021). Analysis of COVID-19 in Professionals Working in Geriatric Environment: Multicenter Prospective Study. *International Journal of Environmental Research and Public Health*, *18*(18), 9735.

Aim: Describe the sociodemographic and clinical characteristics of HCWs tested for SARS-CoV-2 while working in a geriatric environment and analyse the generally described risks and protective factors for COVID-19 in the same population of HCWs.

Population (country): HCWs (France)

Study design (participant number): Cross-sectional survey (n=83)

PPE examined: Respirator (N95 or equivalent); Surgical / medical mask

Primary outcome: Laboratory-confirmed SARS-CoV-2 infection (RT-PCR)

Study period: 15 May, 2020 to 15 September, 2020

Risk of bias (quality): 7/14 (Low quality / high risk of bias)

Summary of findings: Amongst 171 HCWs responding to the survey, 83 were tested for SARS-CoV-2 by RT-PCR; 38 HCWs had confirmed SARS-CoV-2 infection (PCR+) and 45 tested negative PCR-). The PCR+ and PCR- groups were compared to describe risks and identify protective factors. There were significantly more users of surgical masks in the PCR+ group compared to the PCR- group (87% vs 67%; p = 0.035). There were significantly more FFP2 mask users in the PCR− group compared to the PCR+ group (47% vs 21%, p = 0.016).

Conclusion: The use of FFP2 masks was found to reduce the risk of SARS-CoV-2 infection during medical and paramedical procedures, however, the same link for those who used surgical masks during working hours could not be found.

Velay, A., Gallais, F., Wendling, M. J., Bayer, S., Reix, N., Schneider, A., ... & Fafi-Kremer, S. (2022). COVID-19 exposure in SARS-CoV-2-seropositive hospital staff members during the first pandemic wave at Strasbourg University Hospital, France. *Infectious Diseases Now*, *52*(1), 23-30.

Aim: Describe clinical and virological data, exposure history to COVID-19, and adherence to strict hygiene standards during the first pandemic wave in 1,497 workers undergoing a SARS-CoV-2 serological test at Strasbourg University Hospital, with a follow up of serology result 3 months later.

Population (country): HCWs (France)

Study design (participant number): Prospective cohort study (n=1,497 and 1,230 at follow-up)

PPE examined: Surgical / medical mask

Primary outcome: Laboratory-confirmed SARS-CoV-2 infection (serology; two commercial assays – Biosynex LFA and EDI ELISA)

Study period: 6 April, 2020 to 7 May, 2020 with follow-up after 3 months

Risk of bias (quality): 7/14 (Low quality / high risk of bias)

Summary of findings: In this longitudinal prospective cohort study, 1497 HCWs provide serum samples and survey data at an initial visit (V0) and of these, 1230 HCWs provided a follow-up serum sample at a 3 month follow up visit (V1). Amongst the entire cohort, 515 (34.4%) were SARS-CoV-2 seropositive at V0, mainly medical students and assistant nurses. Exposure factors associated with SARS-CoV-2 seropositive status included contact with a COVID-19 patient (OR 1.6, 95% CI 1.1-2.2). Among all PPE reported, only the use of a surgical mask was significantly less frequently reported by seropositive subjects than seronegative subjects at V0 (OR: 1.9; 95% CI: 1.3–2.8, p=0.0007). There was no significant difference between seropositive and seronegative subjects in reported use of FFP2 masks (OR 1.1; 95% CI: 0.8-1.6, p=0.71). Among those who reported occasionally or never wearing a surgical mask, nurses, assistant nurses, and medical students were predominant, despite the fact that these professional categories were precisely those most frequently exposed to COVID-19 patients. No non-professional exposure was reported for many of the medical students and assistant nurses who were SARS-CoV-2 seropositive and confirmed to have infection by PCR.

Conclusion: Systematic adherence to strict hygiene standards was similar between seropositive and seronegative subjects, except for the systematic use of a surgical mask. Nurses, assistant nurses and medical students were more likely to report occasionally or never wearing a surgical mask compared to other professions, and medical students and assistant nurses were more likely represented among seropositive subjects. In these subjects, SARS-CoV-2 transmission could most likely have been avoided by the simple act of systematically wearing a surgical mask.

Shah, V. P., Breeher, L. E., Hainy, C. M., & Swift, M. D. (2021). Evaluation of healthcare personnel exposures to patients with severe acute respiratory coronavirus virus 2 (SARS-CoV-2) associated with personal protective equipment. *Infection Control & Hospital Epidemiology*, 1-5.

Aim: Identify PPE-related factors associated with disease transmission to HCP from SARS-CoV-2 exposures at our tertiary-care center in Minnesota.

Population (country): HCWs (USA)

Study design (participant number): Retrospective cohort study (n=345)

PPE examined: Respirator (N95 or equivalent); Surgical / medical mask

Primary outcome: Laboratory-confirmed SARS-CoV-2 infection (RT-PCR)

Study period: 13 May, 2020 to 30 November, 2020

Risk of bias (quality): 5/14 (Low quality / high risk of bias)

Summary of findings: In this retrospective cohort study, all HCWs who sustained a significant exposure to a patient with COVID-19 were evaluated. Over the 6 month study period, 348 HCWs were deemed to have sustained a significant exposure, of whom 345 were tested for SARS-CoV-2 by PCR during their 14 day post-exposure quarantine period and included in this evaluation. Most (>95%) exposures occurred in the hospital setting and nurses accounted for 59% of exposures; only one third of exposures occurred in dedicated COVID-19 units. Of the 345 HCW with significant exposures, 8 (2.3%) tested positive for SARS-CoV-2 during their quarantine period. Overall, the most common reason for a significant exposure was the use of a surgical face mask instead of a respirator during an aerosol-generating procedure (AGP; 55.9%). However, the use of a surgical face mask instead of a respirator during an AGP was not associated with testing positive for SARS-CoV-2 during the postexposure quarantine period (RR, 0.99; 95% CI, 0.96–1, p=1).

Conclusion: Most patient-to-HCW transmission occurred in units that do not typically provide care for patients with COVID-19. While the use of a face mask rather than a respirator during an aerosol-generating procedure (AGP) did not result in significantly elevated transmission of SARS-CoV-2, this evaluation was not designed to assess airborne spread of SARS-CoV-2 outside of PPE lapses during an AGP. The absence of association between lapse in use of a respirator and SARS-CoV-2 transmission in this study could be due to multiple factors including the protection in place from use of a face mask in these instances. In addition, a conservative approach was taken when assessing exposures during AGPs, and no time threshold was in place by which to consider an exposure without a respirator significant. Therefore, even brief exposures <5 minutes during AGP were classified as significant if appropriate PPE was not used

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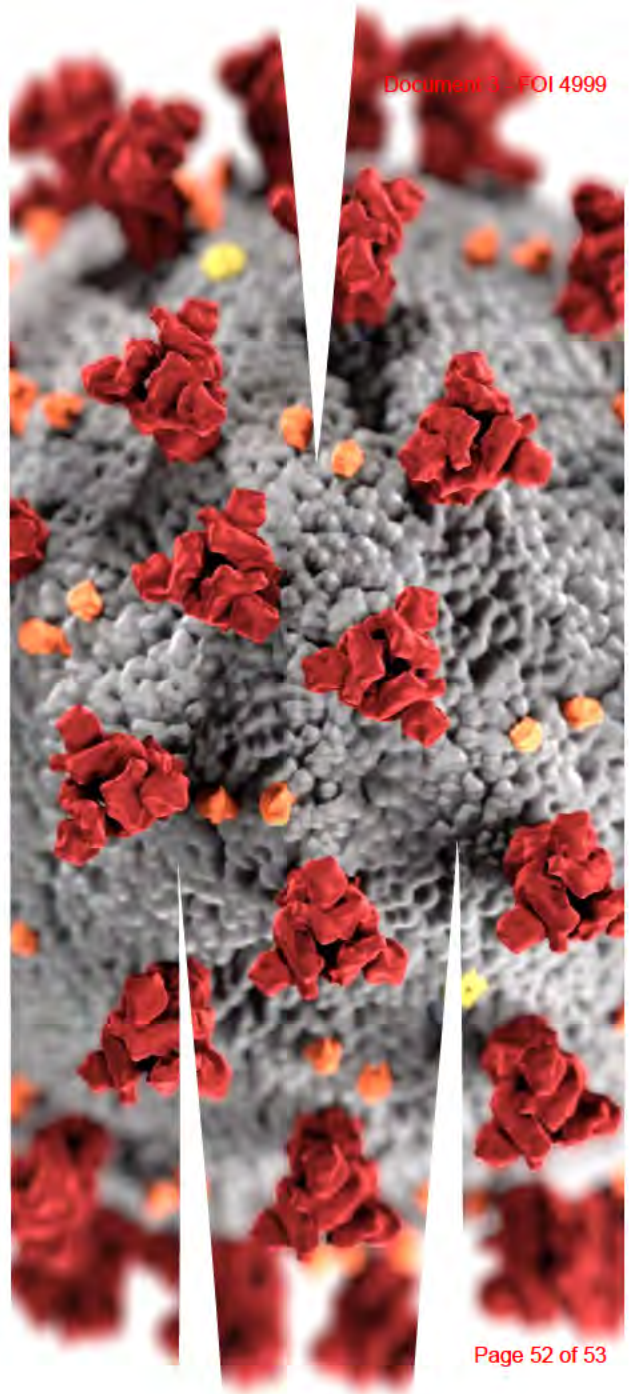
Supplementary information: quality assessment tool used for primary studies



QUALITY ASSESSMENT TOOL FOR PRIMARY STUDIES

1. Did the study address a clearly focused issue?
2. Did the authors use an appropriate method to answer their question?
3. Were participants recruited in an acceptable way?
4. Was the exposure accurately measured to minimise bias?
5. Was the outcome accurately measured to minimise bias?
6. Aside from the experimental intervention, were the groups treated equally? (experimental design only)
7. Was the follow up of subjects complete enough? (experimental design only)
8. Was the follow up of subjects long enough? (experimental design only)\
9. Have the authors taken account of the potential confounding factors in the design and/or in their analysis?
10. How precise was the estimate of the treatment effect or difference between groups?
11. Do you believe the results?
12. Do the results of the study fit with other available evidence?
13. Can the results be applied to the local population?
14. Have ethical issues been taken into consideration?

Note: All questions had the ability to respond 'Yes', 'No', 'Unclear' or 'N/A'. Except for question 10, where the responses were 'Precise', 'Not precise', 'Can't tell' and 'N/A'
This tool was created for the purpose of this review and the need to assess quality of studies using different study designs. It was created using unique items from:

- Critical Appraisal Skills Programme. CASP Qualitative Studies Checklist. https://casp-uk.net/casp-tools-checklists/. Published 2022. Accessed June 7, 2022
- Critical Appraisal Skills Programme. CASP Case Control Study Checklist. https://casp-uk.net/casp-tools-checklists/. Published 2022. Accessed June 7, 2022
- Critical Appraisal Skills Programme. CASP Case Control Study Checklist. https://casp-uk.net/casp-tools-checklists/. Published 2022. Accessed June 7, 2022.