McMaster University | HEALTH FORUM

RISE Rapid-Improvement Support and Exchange

COVID-19 Rapid Evidence Profile #6 (30 April 2020)

Questions

What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?

What we found

Strategies for supporting the use of masks under shortage conditions to prevent COVID-19 can be related to one or more of the following:

1) producing (home-based production, rapid technological innovations, and fast tracking regulatory processes);
2) allocating (efficient allocation and stocking practices);
3) using masks (e.g., support for correct use and monitoring for correct use);
4) conserving masks (use beyond the recommended duration and use beyond the recommended shelf life);
5) re-using masks (re-using by the same person without decontaminating, decontaminating and reusing by the same person, and decontaminating and reusing by others); and
6) repurposing masks (medical masks and alternative materials).

We identified 50 documents that provide highly relevant evidence to answer the question in relation to these six areas:

1) nine highly relevant systematic reviews;
2) 10 highly relevant rapid reviews; and
3) 31 guidelines that were developed using some type of evidence synthesis and/or expert opinion.

Evidence about strategies for supporting the use of masks under shortage conditions

We provide a listing of the key findings from the 46 highly relevant documents that we identified in Table 1, as well as a listing of the type and number of documents that were identified by strategy and setting/population in Table 2. Given the large

Box 1: Our approach

We identified evidence addressing the question by searching the guide to COVID-19 evidence sources between 27 and 30 of April 2020 as part of work being completed on two other rapid evidence profiles (www.mcmasterforum.org/find-evidence/guide-to-covid-19-evidence-sources). We identified experiences with implementation by searching jurisdiction-specific sources of evidence on the same website, with a focus on reviewing those from countries that have experienced shortages of personal protective equipment, as well as searching Canadian provincial and territorial web pages dedicated to COVID-19.

We searched for guidelines that were developed using a robust process (e.g., GRADE), full systematic reviews (or review-derived products such as overviews of systematic reviews), rapid reviews, protocols for systematic reviews, and titles/questions for systematic reviews or rapid reviews that have been identified as either being conducted or prioritized to be conducted. Single studies were only included if no relevant systematic reviews were identified.

We appraised the methodological quality of full systematic reviews and rapid reviews using AMSTAR. Note that quality appraisal scores for rapid reviews are often lower because of the methodological shortcuts that need to be taken to accommodate compressed timeframes. AMSTAR rates overall quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality. It is important to note that the AMSTAR tool was developed to assess reviews focused on clinical interventions, so not all criteria apply to systematic reviews pertaining to delivery, financial or governance arrangements within health systems.

This rapid evidence response was prepared in three hours or less to inform next steps in evidence synthesis, guideline development and/or decision-making related to the question that was posed.

volume of relevant documents identified, we provide in Appendix 1 a more detailed listing of each of the documents (organized by document type, setting and population, and sorted by relevance to the question and COVID-19), with the colour gradient used to reflect high (darkest blue) to low (lightest blue) relevance to the question and to COVID-19. We provide in Appendix 2 the abstracts for the highly relevant documents (except for many guidelines that did not contain an abstract), and we provide in Appendix 3 a list of documents excluded at the final stage of reviewing. We have also provided a framework for considering risk from the Chinese government in Appendix 4, which can be considered an innovation in segmenting the population into groups that would benefit from different types of masks.

Canadian and international experiences with strategies supporting the use of masks under shortage conditions

We provide in Table 3 the details about the provincial and territorial experiences in Canada. In Canada, provinces and territories are following directives from the Government of Canada and the Public Health Agency of Canada, unless otherwise noted in the table below.

In Ontario specifically (where the request for this rapid-evidence profile originated), there are directives or supports related to producing, allocating, using, reusing and repurposing masks (which sometimes are similar to those being provided in other countries):

- Ontario Together was launched to help businesses and their employees work with the province to redeploy capacity towards the production of essential equipment (initiatives to redeploy capacity towards producing medical products were taken by the U.S. Food and Drug Administration, which issued an Emergency Use Authorization to help make medical products such as masks available as quickly as possible by allowing unapproved medical products to reach patients in need when there are no adequate FDA-approved and available alternatives);
- an ethics prioritization guidance on the use of personal protective equipment under critical shortages has been produced (prioritization guidance is being adopted in most provinces across Canada, as well in China, New Zealand, the U.K. and the U.S.);
- guidelines and training on the safe use of personal protective equipment have been established for medical workers as well as for individuals with suspected or confirmed cases of COVID-19 (guidelines and training have also been adopted in all provinces, and territories, as well as in all of the other countries examined); and
- a provincial recommendation suggests that all citizens consider using a face covering to reduce the risk of transmission of COVID-19 in areas where physical distancing may be challenging or impossible, while ensuring proper use, cleaning and disposal of face coverings (this has also been adopted by all provinces, territories and all other countries examined).

We provide in Table 4 details about international experiences, with a focus on eight countries, namely China, France, Germany, Italy, New Zealand, South Korea, the U.K. and the U.S. We selected the countries because they have (or had) a high prevalence of COVID-19 and/or have gradually reopened. International responses have been particularly focused on establishing guidance on prioritizing the allocation of medical masks, and in ensuring correct use and reuse of medical and non-medical masks in different settings and by different populations. Some countries used policy levers to redeploy capacity towards producing masks (such as the U.S.), but our scan found limited efforts to support innovation in developing new technological solutions.

Table 1: Key findings from the highly relevant documents (with documents numbered in the order that they first appear in the same table section and then with just the number repeated thereafter)

Strategies for supporting the use of masks under shortage conditions		Overview of key findings/focus of documents that provide highly relevant evidence to answer the question
Producing	Home-based production	**Systematic reviews** • No systematic reviews identified **Rapid reviews** • No rapid reviews identified **Guidelines developed using some type of evidence synthesis and/or expert opinion** • No guidelines identified
	Rapid technological innovations	**Systematic reviews** • No systematic reviews identified **Rapid reviews** 1) Very limited evidence on effectiveness of 3D-printed N95 respirators and face shields and many health authorities emphasized that 3D-printed N95 respirators may not provide the same fluid barrier and air filtration protection (AMSTAR rating 4/9; search conducted on 3 April 2020) **Guidelines developed using some type of evidence synthesis and/or expert opinion** • No guidelines identified
	Fast tracking regulatory processes	**Systematic reviews** • No systematic reviews identified **Rapid reviews** • No rapid reviews identified **Guidelines developed using some type of evidence synthesis and/or expert opinion** • No guidelines identified
Allocating	Efficient allocation	**Systematic reviews** 1) Lack of evidence about use of masks by those not diagnosed with COVID-19 to limit spread (AMSTAR rating 3/6; search conducted 10 April 2020) **Rapid reviews** • No rapid reviews identified **Guidelines developed using some type of evidence synthesis and/or expert opinion** 1) Strategies must be put in place to address expected or known face-mask shortages (U.S. - Emergency Care Research Institute; last updated 22 April 2020) 2) Conventional-, contingency- and crisis-capacity strategies are necessary to optimize the supply of N95 respirators (U.S. CDC; last updated 2 April 2020)

Strategies for supporting the use of masks under shortage conditions		Overview of key findings/focus of documents that provide highly relevant evidence to answer the question
		3) Ethics prioritization guidance on the use of personal protective equipment under critical shortages (Ontario Health Bioethics Table; last updated 25 March 2020)
	Stocking practices (including monitoring)	**Systematic reviews** • No systematic reviews identified **Rapid reviews** • No rapid reviews identified **Guidelines** • See guidelines #2, above 4) Several strategies can be used to address personal protective equipment, including masks, shortages during a pandemic, from optimizing supplies to conserving and reusing masks (U.S. - Emergency Care Research Institute; last updated 24 March 2020) 5) Three strategies should be used to optimize the availability of personal protective equipment: minimizing the need for PPE, ensuring rational and appropriate use of PPE and coordinating PPE supply chain management mechanisms (WHO technical guidance; last updated 19 March 2020)
Using [compliance]	Supporting correct use	**Systematic reviews** 2) Long and frequently changing guidelines make it difficult for staff to adhere to best practices in infection control and prevention (AMSTAR score 7/9; search conducted 26 March 2020) 3) Using standard PPE and providing training for donning and doffing masks reduces contamination from highly infectious diseases (AMSTAR score 9/10; search conducted 20 March 2020) 4) Preservation of N95 respirators for high-risk procedures should be considered when in short supply (AMSTAR score 7/10, 9 March 2020) 5) Standard surgical masks are as effective as N95 for preventing infection of healthcare workers (AMSTAR score 7/10, March 2020) **Rapid reviews** 2) Evidence not strong enough to recommend universal wearing of masks, but may be slightly protective against infection from casual community contact, modestly effective against household infections when both infected and non-infected people wear them, and useful for high-risk individuals in transient situations (AMSTAR rating 7/11; search conducted 6 April 2020) 3) No evidence that cloth masks in the community setting prevent viral respiratory illness and may present a risk to the wearer (AMSTAR rating 6/9; search conducted 31 March 2020) 4) Masks are essential for front-line workers alongside other PPE, but are not recommended to be worn by all citizens (AMSTAR rating 1/9; search conducted 20 March 2020) 5) Evidence about effectiveness of face masks was based mostly on medical-grade masks and is not sufficiently strong to support widespread use as a protective measure against COVID-19, but there is enough evidence to

Strategies for supporting the use of masks under shortage conditions		Overview of key findings/focus of documents that provide highly relevant evidence to answer the question
		support the use of face masks for short periods of time (e.g., by vulnerable individuals) (AMSTAR rating 7/11; search conducted 31 January 2020) **Guidelines** • See guidelines #1 and 5 above 6) Different guidance is required for the appropriate use in different workplaces and by different employees (Institut National de Santé Publique du Québec; last updated 29 April 2020) 7) Use of PPE by health and social-care workers in the context of COVID-19 pandemic (Public Health England; last updated 24 April 2020) 8) Employees should wear a face mask at all times while in the workplace for 14 days after being in contact with a COVID-19 case (U.S. CDC; last updated 20 April 2020) 9) Cloth masks (e.g., cotton or gauze) are not recommended under any circumstances to prevent the transmission of respiratory infection in low-risk community settings (Joanna Briggs Institute Evidence Summary; last updated 19 April 2020) 10) Risk-informed decision-making guidelines for workplaces and businesses during the COVID-19 pandemic (Government of Canada; last updated 17 April 2020) 11) Different guidance is required for the appropriate use in communities, schools, workplaces, and events (U.S. CDC; last updated 17 April 2020) 12) When worn properly, homemade masks may help reduce the spread of COVID-19 from infected people to non-infected people (Government of Canada; last updated 16 April 2020) 13) In making recommendations for conserving N95 supply, the use of homemade masks with full face shield is considered as last resort (U.S. - Emergency Care Research Institute; last updated 15 April 2020) 14) It is recommended to wear cloth face coverings in public settings where other social distancing measures are difficult to maintain (e.g., grocery stores and pharmacies) especially in areas of significant community-based transmission (U.S. CDC; last updated 13 April 2020) 15) Precautionary principle drawing on best-available evidence should be used to recommend everyone wear face masks during COVID-19 pandemic (guideline produced by a multi-country team of researchers; last updated 9 April 2020) 16) Medical masks may be worn among professions that have close proximity with other people (e.g., cashiers, police force) when asymptomatic cases are thought to be high (WHO technical guidance; last updated 8 April 2020) 17) Non-medical face masks are less effective than medical face masks, and when asymptomatic cases in the community are assumed to be high, masks could be considered in high-risk settings (e.g., taking public transport and visiting busy stores) (European Centre for Disease Prevention and Control; last updated 8 April 2020)

Strategies for supporting the use of masks under shortage conditions		Overview of key findings/focus of documents that provide highly relevant evidence to answer the question
		18) There is no current evidence to make a recommendation for or against the use of non-medical masks made of other materials (e.g., cotton fabric) in the community setting, and if decision-makers proceed with advising the use of non-medical masks, the features to consider include numbers of layers of fabric/tissue, breathability of material used, water repellence/hydrophobic qualities, shape of mask and fit of mask (WHO technical guidance; last updated 6 April 2020) 19) Some staff working in points of entry at airports, ports and ground crossing should be wearing medical masks (e.g., screeners, interviewers, cleaners) (WHO technical guidance; last updated 6 April 2020) 20) Medical masks should be reserved for healthcare workers (WHO technical guidance; last updated 6 April 2020) 21) Evidence is inconclusive about effectiveness of cloth face coverings worn by the public (U.S. - Emergency Care Research Institute; last updated 6 April) 22) Different guidance is required for the appropriate use in schools, workplaces, long-term care facilities and institutions (WHO technical guidance; last updated April 2020) 23) Medical masks should be worn by front-line workers including police and military (Colleges of Medicines of South Africa; last updated 31 March 2020) 24) The reuse, or extended use, of masks and respirators designed for single use, may be done in acute healthcare settings under certain circumstances (Joanna Briggs Institute Evidence Summary; last updated 31 March 2020) 25) A medical/surgical mask should always be worn when providing direct patient care to a patient with known or suspected respiratory infection (Joanna Briggs Institute Evidence Summary; last updated 30 March 2020) 26) Non-healthcare workers should be trained in the correct use of a surgical mask (Public Health England; last updated 26 March 2020) 27) Recommendations for face-mask use among the general public in community settings were inconsistent in a comparison of recommendations from different jurisdictions (multi-country comparison of guidelines; last updated 20 March 2020) 28) Guidelines for wearing masks (China's Joint Prevention and Control Mechanism of the State Council; last updated 17 March 2020) 29) Most workers at high or very high exposure risk likely need to wear personal protective equipment, including a face mask or a respirator, depending on their job tasks and exposure risks (U.S. Department of Labor and Department of Health & Human Services; last updated March 2020) 30) Medical/surgical mask should be made available in workplaces for workers developing respiratory symptoms including prisons and other places of detention (WHO technical guidance; last updated March 2020) 31) Guidelines for selection and use of masks to prevent COVID-19 in different populations (China's Joint Prevention and Control Mechanism of the State Council; 4 February 2020)
	Monitoring for correct use	**Systematic reviews** • No systematic reviews identified **Rapid reviews**

Strategies for supporting the use of masks under shortage conditions		Overview of key findings/focus of documents that provide highly relevant evidence to answer the question
		• No rapid reviews identified **Guidelines** • See guidelines #1 and 5 above
Conserving	Use beyond the recommended duration (extended use)	**Systematic reviews** 6) Decontaminating using ultraviolet light germicidal irradiation, vaporous hydrogen peroxide, and heat-based decontamination as well as extending the use and shelf life of N95 masks may support overcoming supply shortages (AMSTAR score 1/9; search conducted 17 April 2020) **Rapid reviews** 6) Reprocessing using ultraviolet light germicidal irradiation, vaporous hydrogen peroxide, and heat-based decontamination may be effective for decontaminating for the reuse of N95 masks, and extension of shelf life and extended use may also be options (AMSTAR rating 1/9; search conducted 27 April 2020) 7) In shortage contexts, extended use of N95 respirators is preferred over reuse, and wearing expired N95 respirators can be considered, after carefully inspecting them (AMSTAR score 1/9; search conducted 15 April 2020) 8) Limited evidence from laboratory studies supports prioritizing extended use over reuse because N95s may readily spread infection by touch if donned and doffed, and are prone to mechanical failure upon reuse (AMSTAR score 2/9; search conducted 23 March 2020) **Guidelines** • See guidelines #4, 24, 28 and 31 above
	Use beyond the recommended shelf life	**Systematic reviews** • See systematic review #6 above **Rapid reviews** • See rapid reviews #6 and 7 above **Guidelines** • No guidelines identified
Reusing	Reusing by the same person without decontaminating	**Systematic reviews** • No systematic reviews identified **Rapid reviews** • See rapid reviews #6 and 7 above 9) Microwave irradiation and heat provides safe and effective decontamination options for N95 filtering facepiece respirator reuse during critical shortages, autoclaving masks is not recommended, and any mask disinfected using these methods should be inspected for physical degradation before reuse (AMSTAR rating 2/9; search conducted 29 March 2020) **Guidelines**

Strategies for supporting the use of masks under shortage conditions		Overview of key findings/focus of documents that provide highly relevant evidence to answer the question
		• No guidelines identified
	Decontaminating and reusing by the same person	**Systematic reviews** • See systematic review #6 above 7) Vaporized hydrogen peroxide successfully decontaminates N95 facepiece respirators, whereas alcohol or sodium hypochlorite are not recommended (AMSTAR score 7/11; search conducted 31 March 2020) 8) Microwave irradiation and heat can provide safe and effective decontamination options for N95 mask reuse during shortages (AMSTAR rating 7/10; search conducted 29 March 2020) 9) Ultraviolet light germicidal irradiation can restore N95 masks to certification standards of the National Institute for Occupation Safety and Health (U.S.) (AMSTAR score 7/10; search conducted 24 March 2020) **Rapid reviews** • See rapid reviews #6 and 9 above **Guidelines** • No guidelines identified
	Decontaminating and reusing by others	**Systematic reviews** • See systematic reviews #6, 7, 8, and 9 above **Rapid reviews** • See rapid review #8 above **Guidelines** • See guidelines #4, 13, 24 above
Repurposing	Medical masks	**Systematic reviews** • No systematic reviews identified **Rapid reviews** • No rapid reviews identified **Guidelines** • See guidelines #8, 13, 15, 16, 17, 19, 20, 23, 25, 27, 30 above
	Alternative materials	**Systematic reviews** • No systematic reviews identified **Rapid reviews** 10) The use of cloth masks in healthcare settings might increase the rates of infection, and it should be used as last resort (AMSTAR rating 1/9; search conducted 7 April 2020) **Guidelines** • See guidelines #9, 12, 13, 14, 15, 17, 18, 20, 21, 25, 27 above

Table 2: Overview of type and number of documents that were identified by strategy and setting/population

Strategies for supporting the use of masks under shortage conditions		Total # of highly relevant documents[i,ii]	Setting/population					
			Healthcare settings		Non-healthcare settings			
			Medical workers	Non-medical workers	Essential workers	Citizens with confirmed/suspected COVID-19	High-risk citizens	All citizens
Producing	Home-based production	SR= 0 RR= 0 G= 0 P= 2 T=2	P=1	-	-	T=1	T=1	P=1 T=2
	Rapid technological innovations	SR=0 RR=1 G= 0 P=0 T=0	RR=1	-	-	-	-	-
	Fast tracking regulatory processes	SR=0 RR=0 G=0 P=0 T=0	-	-	-	-	-	-
Allocating	Efficient allocation	SR=2 RR=0 G=4 P=0 T=0	SR=2 G=4	SR=1 G=4	SR=1 G=1	SR=1 G=0	SR=1 G=0	SR=1 G=0
	Stocking practices (including monitoring)	SR=0 RR=0 G=1 P=0 T=0	G=1	-	-	-	-	-
Using [compliance]	Supporting correct use	SR=4 RR=4 G= 29 P=0 T=0	SR= 4 RR=2 G= 10	RR=1 G= 5	G=9	RR=3 G=9	RR=2 G= 3	RR=4 G= 16

Strategies for supporting the use of masks under shortage conditions		Total # of highly relevant documents[i,ii]	Setting/population					
			Healthcare settings		Non-healthcare settings			
			Medical workers	Non-medical workers	Essential workers	Citizens with confirmed/suspected COVID-19	High-risk citizens	All citizens
	Monitoring for correct use	SR=0 RR=0 G=2 P=0 T=0	G=2	G=2	G=1	-	-	-
Conserving	Use beyond the recommended duration (extended use)	SR= 1 RR= 3 G= 4 P= 0 T= 2	SR=1 RR= 2 G= 3 T=2	G=2	G=2	G=2	G=2	G=2
	Use beyond the recommended shelf life	SR=1 RR=2 G=0 P=0 T=0	SR=1 RR=2	-	-	-	-	-
Reusing	Reusing by the same person without decontaminating	SR=0 RR=4 G=0 P=0 T=0	RR=3	-	-	-	-	-
	Decontaminating and reusing by the same pers3on	SR=3 RR=3 G=0 P=1 T=3	SR=3 RR=2 P=1 T=3	SR=1 T=1	-	-	-	-
	Decontaminating and reusing by others	SR= RR=1 G= 0 P=1 T=3	SR=3 RR=1 T=3	SR=1 T=1	-	-	-	-
Repurposing	Medical masks	SR=0 RR=0	G=4 T=1	G=1	G=6	G=1	G=1	G=4

Strategies for supporting the use of masks under shortage conditions		Total # of highly relevant documents[i,ii]	Setting/population					
			Healthcare settings		Non-healthcare settings			
			Medical workers	Non-medical workers	Essential workers	Citizens with confirmed/suspected COVID-19	High-risk citizens	All citizens
		G=11 P=0 T=1						
	Alternative materials	SR=0 RR=1 G=11 P=0 T=2	G=2 T=2	G=1	G=1	G=1	G=1	G=9

i) SR = systematic reviews; RR = rapid reviews (RR), G = guidelines; P = protocols; T = titles/questions

ii) Where the sum of the numbers deviate from the total it is because one or more documents address multiple settings/populations

Table 3. Canadian experiences with supporting the use of masks under shortage conditions

Province/ territory	Key features of implemented strategies
Pan-Canadian	• **Producing:** Health Canada has expedited their approval process for product reviews as well as establishing additional licences related to essential products o Government of Canada has established www.buyandsell.gc.ca, which aims to match businesses that can supply needed products and services with specific gaps • **Conserving:** Health Canada has suggested that while N95 and surgical masks past their designated shelf life are no longer certified, they can be used in times of increased demand and decreased supply so long as the straps are intact, there are no visible signs of damage, and the mask can still be fit tested o No specific timeframe has been established • **Reusing:** Health Canada is considering the decontamination of N95 respirators as a strategy to ensure sufficient supply, and is considering potential suppliers who are able to reprocess these masks while maintaining their performance • **Repurposing:** Health Canada has recommended that commercial N95 respirators may be used during the COVID-19 outbreak if alternatives are not available o Other models similar to the approved N95 may be used if they meet related specifications, such as the KN95 respirators
B.C.	• **Producing:** The BC Centre for Disease Control (CDC) has stated that homemade masks should be made out of 100% cotton such as clean t-shirts or pillowcases, and need to fit tightly around the nose and mouth • **Using:** The BC CDC has stated that medical masks and N95 respirators should be reserved for healthcare workers and those who are sick o With respect to community wearing of masks, the BC CDC has stated that homemade masks should only be considered by members of the public who are symptomatic or caring for someone who is symptomatic while a commercial mask is being procured o The BC CDC has also developed a number of visuals that depict correct ways for workers to put on (don) and take off (doffing) personal protective equipment (PPE) • **Allocating:** In an effort to mitigate shortages in PPE supplies, the government has established a Provincial Supply Chain Coordination Unit to coordinate goods and services distribution and to take over supply chains for delivering essential goods and services throughout the province, and allows the government to demand that retailers and suppliers report inventory of PPE o Government has established an emergency prioritization in a pandemic PPE allocation framework, which provides guidance for the conservation, reuse and priority allocation of PPE
Alberta	• **Producing:** The Government of Alberta announced the 'Bits and Pieces Program' which works with individuals, private companies and non-profit organizations to develop needed products and services, including personal protective equipment, that meet provincial standards • **Allocating:** In enacting the Emergency Management Act, the Emergency Management Agency was created to coordinate emergency responses, specifically to manage the supply chain, including procurement and distribution of PPE o As part of this initiative, the provincial government has also centralized the request for PPE for non-Alberta Health Services facilities including pharmacies, disability service providers, and social-service and civil-society groups helping to ensure efficient procurement and allocation • **Using:** Alberta Health Services currently recommends continuous masking for healthcare workers using a surgical or procedure masks as well as for patients with confirmed cases of COVID-19

Province/ territory	Key features of implemented strategies
	○ Alberta Health Services notes that homemade cloth masks have not been proven to protect the person wearing them, but if citizens are going to wear them they should follow provincial directions • **Conserving:** Alberta Occupational Health and Safety extended the expiry period of existing fit tests on the current respirator model to December 31, 2020 • **Reusing:** Alberta Health Service is collecting used N95 models for decontamination, sterilization and storing them until it is clear that an organization is unable to source new supplies
Saskatchewan	• **Using:** Saskatchewan Health Authority has recommended that most non-medical workers will not require the use of medical masks unless they are in a similar setting to healthcare such as first responders, corrections officers, group-home and personal home-care workers, and funeral-home staff. • **Conserving:** Saskatchewan Health Authority has issued recommendations for extended use of face masks and eye protection for a number of different sectors including acute care, continuing care, testing assessment sites, home care, and primary care • **Reusing:** Saskatchewan Health Authority has begun a province-wide process of collecting and reprocessing N95 masks with the exception of those where elastics are no longer in good condition or they have been used for the preparation of or procedures that involve cytotoxic medications
Manitoba	• **Allocating:** Shared Health Manitoba has created a PPE supply management and stewardship planning and guidance framework which includes the prioritization of PPE for the most at-risk healthcare workers • **Using:** Shared Health Manitoba has defined provincial requirements for PPE in healthcare settings • **Reusing:** Shared Health Manitoba has said that lightly used N95 respirators are eligible for sterilization
Ontario	• **Producing:** The Government of Ontario launched the website Ontario Together to help businesses and their employees work with the province to redeploy capacity towards the production of essential equipment ○ To resolve procurement issues in the long-term care sector, the province established the 24/7 Long Term Care COVID-19 Response Team • **Using:** Guidelines and training on the safe use of PPE has been established for medical workers as well as for individuals with suspect or confirmed cases of COVID-19 ○ Provincial recommendations for all citizens is to consider using a face covering to reduce the risk of transmission of COVID-19 in areas where physical distancing may be challenging or not possible, while ensuring to properly use, clean, and dispose of face coverings ○ Public Health Ontario has issued additional guidance related to mask use in healthcare settings and retirement homes
Quebec	• **Allocating:** The Ministry of Health and Social Services is planning a strategy for supplying drugs, equipment and supplies required during the COVID-19 pandemic • **Using:** The Institut national de santé publique du Québec produced several guidelines to support the appropriate use of masks and respirators, including: ○ Exceptional measures for personal protective equipment (including masks) during a pandemic ○ Guidelines on wearing a procedure mask in healthcare settings during sustained community transmission • **Conserving and reusing:** The Institut national de santé publique du Québec produced several guidelines to support the storing and reuse of masks and respirators, including

Province/ territory	Key features of implemented strategies
	○ Interim guidelines: collection, disinfection and storage process for single-use N95 respirators ○ Guidelines on the use of expired N95 respirators • **Repurposing:** The Institut national de santé publique du Québec released guidelines on the use of face masks (e.g., cloth mask) for all citizens
New Brunswick	• **Producing:** Service New Brunswick has opened up a process for established businesses to donate personal protective equipment to help medical workers
Nova Scotia	• **Allocating:** Nova Scotia Health Authority has established a centralized process for urgent PPE requests as well as having deployed on-site counters to count PPE to ensure that the supply continues to meet the needs • **Using:** Nova Scotia Health Authority has issued recommendations by sector and setting for PPE and mask wearing for medical workers as well as guides to putting on and taking off PPE safely • **Conserving:** Nova Scotia Health Authority implemented a system alongside universal masking directives for all staff working in clinical areas, whereby masks needs to be signed out by a unit manager or designate
Prince Edward Island	• **Producing:** Government of PEI have provided directions on the fit and material for homemade face coverings should citizens choose to wear them, including choosing materials such as cotton or linen and ensuring it is made of at least two layers • **Allocating:** COVID-19 Joint Response Team has been put in charge of monitoring and adjusting supplies to ensure PPE is available across the province • **Using:** Guidelines and visual posters have been created on the use of PPE for medical workers
Newfoundland and Labrador	• **Using:** Government of Newfoundland and Labrador have established guidelines for how to safely put on and remove personal protective equipment
Yukon	• **Using:** Government of Yukon has established recommendations for PPE for different sectors and settings including outpatient facilities • The government has also included guidelines for putting on and taking off PPE safely
Northwest Territories	• **Using:** Office of the Chief Public Health Officer is recommending that residents use reusable or disposable face coverings when in public places
Nunavut	• **Producing:** Government of Nunavut has created instructions on how to create a non-medical mask at home • **Using:** Government of Nunavut has established requirements for face covering for air travellers coming in and out of the territory

Table 4. International experiences with supporting the use of masks under shortage conditions

Country	Key features of implemented strategies
China	**Using** • China's Joint Prevention and Control Mechanism of the State Council released guidelines for selection and use of masks to prevent COVID-19 in different populations • As of 4 February 2020, people have been divided into risk levels o Those at low risk and above being asked to wear a disposable medical mask, and those at very low risk of infection do not have to wear a mask or can wear a cloth mask o Those deemed to be of very low risk of infection include people who mostly stay indoors and who work or study in well-ventilated areas o Wearing of medical or surgical masks is being recommended for those working in transportation hubs (e.g., train stations, airports, subway stations), supermarkets, restaurants, community policing, prisons, nursing homes, welfare homes, mental health facilities, school classrooms and construction-site housing o Those working in high-risk areas, where it is not possible to keep two metres of distance, are required to wear a mask that conforms to KN94/N95 and above without an exhalation valve
France	**Allocating** • The government elaborated a strategy for the supply and management of protective masks in the country **Using** • The government released guidelines for medical workers about what mask to wear in healthcare settings and non-healthcare settings • The initial response in France was that it was not useful for everyone to use a mask, but the government later noted that this was informed by concerns about scarcity of medical masks. On 15 April 2020, the Prime Minister announced general principles for the end of the lock-down period which will include mandatory use of non-medical masks on public transportation
Germany	**Using** • On 15 April 2020, the national government announced as part of the easing of restrictions that non-medical masks are being recommended to be worn on public transit and in shops • On 20 April 2020, most states announced a requirement to wear non-medical face masks on public transportation and in retail stores, with the exception of Berlin which has only made it mandatory on public transportation • All states have imposed a duty to wear masks in public transport and in shops, however additional information on the type of masks that are required for employees was not found
Italy	**Repurposing:** • On 5 March 2020, the Ministry of Health suggested that homemade face masks should be used only if there is suspicion of being sick or when assisting somebody who is. However, in easing lockdown restrictions, the Scientific and Technical Committee has since stated that safety measures including the use of cloth face masks can reduce the risk of infection among workers returning to their places of employment. No recommendations were found for the use of the medical masks by non-medical essential workers.
New Zealand	**Allocating** • The Ministry of Health released guidance for prioritizing personal protective equipment in healthcare settings **Using and repurposing** • The Ministry of Health released several guidances on the optimal use of personal protective equipment in healthcare settings and non-healthcare workplaces, as well as among the general population • As of 25 April 2020, the New Zealand government does not support the widespread use of face masks by healthy people in the community

Country	Key features of implemented strategies
	• If individuals choose to purchase or make their own masks, the government has published information about how to safely do so and how to wear them, which is accompanied by an outline of the risks of using masks poorly • Medical masks and gloves are recommended for people who are unable to maintain more than one metre contact distance from people with potential COVID-19 symptoms, including, but not limited to, police, prison staff and customs staff
South Korea	**Producing** • Government encouraged companies with capabilities to ramp up their production of masks for distribution to pharmacies in order to supply the general population **Allocating** • Government banned the export of masks to prioritize domestic demand, and prioritized ensuring face masks were allocated first to physicians and medical staff, and after recommending all members of the public wear face masks, use domestically produced masks, and distribute to pharmacies to ration their sale among the general public while releasing guidelines on their reuse • Private companies created apps to indicate how many masks were available to the public at nearby pharmacies, while the National Health Insurance Service Database was used to track how many masks were bought by each citizen **Using** • Government made clear that medical staff should be prioritized for use of masks, but that all citizens should wear masks when in public, tracking and monitoring the sale and use of masks using mobile apps • Medical masks similar to a KF94 or N95 model are recommended for anyone in public or dense locations, including workers **Reusing** • Government published recommendations for how to reuse masks for the general public after rationing their sale in pharmacies
U.K.	**Producing** • The Medicines and Healthcare Products Regulatory Agency has put in place rules that masks must be approved and CE marked before sale in the U.K., and the Office for Product Safety and Standards has provided recommendations about how local businesses and local authorities can produce products that meet regulatory requirements for PPE • There are possible exemptions for some high-volume manufacturers of PPE for the regulatory process if they are meeting standards **Allocating** • Public Health England has recommended that all health and social-care staff know which type of PPE they need to wear in each context and setting, and have access to the proper PPE that is appropriate for the setting in which they work **Using** • Public Health England has recommended: o all health and social-care staff be trained on donning and doffing PPE, and practise hand hygiene after removing any element of PPE; o all health and social-care workers wear a fluid-repellant surgical mask if they are providing care to an individual from a vulnerable group, enter an inpatient area containing possible or confirmed COVID-19 cases, enter the home of a confirmed or possible case, or deem their risk to be high in their care environment; o the rational use of all respirators (FFP3) and surgical masks, which it provides extensive guidance based on best practices about; and o that all patients use face masks, unless their care can be compromised as a result of doing so **Conserving**

Country	Key features of implemented strategies
	• Public Health England has recommended sessional (e.g., a ward round, taking observations of several patients in a cohort bay or ward) use of respirators, fluid-resistant (Type IIR) surgical masks (FRSM) rather than use for a single patient or resident **Reusing** • Public Health England has recommended reuse of masks only if not soiled, damaged or hard to breathe through, made with elastic hooks, stored properly (carefully folded so outer surface held inward, and in a sealable bag or box to reduce contact, and marked with wearer's name), if it maintains good fit between use
U.S.	**Producing** • On April 18, 2020, in response to concerns relating to insufficient supply and availability of face masks, the U.S. Food and Drug Administration issued an Emergency Use Authorization to help make medical products such as masks available as quickly as possible by allowing unapproved medical products to reach patients in need when there are no adequate, FDA-approved and available alternatives **Allocating** • The U.S. Centers for Disease Control and Prevention (CDC) released its Strategies for Optimizing the Supply of N95 Respirators **Using** • The U.S. CDC released different guidance required for the appropriate use in communities, schools, workplaces, and events • The U.S. Department of Labor and Department of Health & Human Services also released guidance indicating that most workers at high or very high exposure risk likely need to wear personal protective equipment, including a face mask or a respirator, depending on their job tasks and exposure risks **Reusing** • The U.S. CDC released recommendations for extended use and limited reuse of N95 filtering facepiece respirators in healthcare settings **Repurposing** • The U.S. CDC recommended wearing cloth face coverings in public settings where other social distancing measures are difficult to maintain (e.g., grocery stores and pharmacies) especially in areas of significant community-based transmission

Waddell K, Wilson MG, Gauvin FP, Mansilla, C, Moat KA, Wang Q, Lavis JN. COVID-19 rapid evidence profile #6: What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19? Hamilton: McMaster Health Forum, 30 April 2020.

The McMaster Health Forum is one of the three co-leads of RISE, which is supported by a grant from the Ontario Ministry of Health to the McMaster Health Forum. To help Ontario Health Team partners and other health- and social-system leaders as they respond to unprecedented challenges related to the COVID-19 pandemic, the Forum is preparing rapid evidence responses like this one. The opinions, results and conclusions are those of the McMaster Health Forum and are independent of the ministry. No endorsement by the ministry is intended or should be inferred.

Appendix 1: Documents that address the question, organized by document type and sorted by relevance to the question and COVID-19

Type of document	Relevance to question	Setting/ population	Focus	Recency or status
Guidelines developed using a robust process (e.g., GRADE)				
Full systematic reviews	• Allocating masks o Efficient allocation	• Healthcare settings o Medical workers o Non-medical workers • Non-healthcare settings o Citizens with confirmed or suspected COVID-19) o All citizens	Lack of evidence about use of masks by those not diagnosed with COVID-19 to limit spread (AMSTAR rating 3/6)	Literature last searched 10 April 2020
	• Using masks o Supporting correct use	• Healthcare settings o Medical workers	Long and frequently changing guidelines make it difficult for staff to adhere to best practices in infection control and prevention (AMSTAR rating 7/9)	Literature last searched 26 March 2020
	• Using masks o Supporting correct use	• Healthcare settings o Medical workers	Using standard PPE and providing training for donning and doffing masks reduces contamination from highly infectious diseases (AMSTAR rating 9/10)	Literature last searched 20 March 2020
	• Using masks o Supporting correct use	• Healthcare settings o Medical workers	Preservation of N95 respirators for high-risk procedures should be considered when in short supply	Literature last searched 9 March 2020
	• Allocating masks o Efficient allocation • Using masks o Supporting correct use	• Healthcare settings o Medical workers	Standard surgical masks are as effective as N95 for preventing infection of healthcare workers (AMSTAR rating 7/10)	Literature last searched March 2020

	• Conserving masks o Use beyond recommended duration o Use beyond recommended shelf life • Re-using masks o Decontaminating and reusing by the same person o Decontaminating and reusing by others	• Healthcare settings o Medical workers	Decontaminating using ultraviolet light germicidal irradiation, vaporous hydrogen peroxide, and heat-based decontamination as well as extending the use and shelf life of N95 masks may support overcoming supply shortages (AMSTAR rating 1/9)	Literature last searched 17 April 2020
	• Reusing • Decontaminating and reusing by the same person or by others	• Healthcare setting o Medical workers • Non-medical workers	Vaporized hydrogen peroxide successfully decontaminates N95 facepiece respirators, whereas alcohol or sodium hypochlorite are not recommended (AMSTAR rating 7/11) (pre-print version)	Literature last searched 31 March 2020
	• Reusing masks o Decontaminating and reusing by the same person o Decontaminating and reusing by others	• Healthcare settings Medical workers	Microwave irradiation and heat can provide safe and effective decontamination options for N95 mask reuse during shortages (AMSTAR rating 7/10)	Literature last searched 29 March 2020
	• Reusing masks o Decontaminating and reusing by the same person o Decontaminating and reusing by others	• Healthcare settings o Medical workers	Ultraviolet light germicidal irradiation can restore N95 masks to certification standards of the National Institute for Occupation Safety and Health (U.S.) (AMSTAR rating 7/10)	Literature last searched 24 March 2020
	• Using masks o Supporting correct use	• Non-medical settings (all citizens)	No studies identified about the effectiveness of face mask to limit the spread of COVID-19 among undiagnosed individuals	Literature searched 15 February 2020
	• Using masks o Supporting correct use	• Healthcare settings o Medical workers	Education alongside additional infection control, peer evaluation, and coloured cues may improve healthcare workers' adherence to standard precautions to control healthcare-associated infections	Literature last searched 14 February 2017

	• Using masks o Supporting correct use	• Healthcare settings o Medical workers	Low-quality evidence has found that education does not have a significant effect on frequency or correct use of respiratory protective equipment	Literature last searched 12 August 2016
	• Using masks o Supporting correct use	• All citizens	Uptake of non-pharmaceutical interventions to reduce infection transmission may require overcoming beliefs about transmission, rejection of personal risk of infection, and concerns of costs and stigma	Literature last searched 23 February 2013
	• Allocating masks o Efficient allocation	• Healthcare settings (medical workers) • Healthcare settings (non-medical workers) • Non-healthcare settings (essential workers)	Choice of masks to recommend during pandemic should be sensitive to rate of transmission, facility infection rate, compliance with interventions, and fatality rates	Literature last searched 19 September 2011
	• Allocating masks o Efficient allocation	• Non-medical settings o All citizens	Evidence is inconclusive about use of surgical masks in community settings	Literature last searched 1 April 2020
	• Allocating masks o Efficient allocation	• Non-medical settings o Essential workers	Masks can reduce the risk of infection among non-healthcare workers	Literature last searched March 2020
	• Allocating masks o Efficient allocation	• Healthcare settings o Medical workers	More comprehensive economic evaluations are required to compare the relative costs and benefits of medical masks versus respirators and the value for money of alternative options	Literature last search October 2015
	• Using masks o Supporting correct use	• Healthcare settings o Medical workers	N95 respirators and surgical masks are equivalent in the risk of laboratory-confirmed influenza	Literature last searched 27 January 2020
	• Using masks o Supporting correct use	• Healthcare settings o Medical workers	It is essential to fully protect all staff with masks in rooms where interventions involving a patient's head and/or neck region are being performed	Last updated April 24 2020
	• Using masks o Supporting correct use	• Healthcare settings o Medical workers	Surgical masks and N95 respirators are the most consistent and comprehensive	Literature last searched October 2010

			support measures to reduce the spread of respiratory viruses	
Rapid reviews	• Producing masks o Rapid technological innovations	• Healthcare settings o Medical workers	Very limited evidence on effectiveness of 3D-printed N95 respirators and face shields and many health authorities emphasized that 3D-printed N95 respirators may not provide the same fluid barrier and air filtration protection (AMSTAR rating 4/9)	Last updated 3 April 2020
	• Using masks o Supporting correct use	• Non-healthcare settings o Citizens with confirmed or suspected COVID-19 o High-risk citizens o All citizens	Evidence not strong enough to recommend universal wearing of masks, but may be slightly protective against infection from casual community contact, modestly effective against household infections when both infected and non-infected people wear them, and useful for high-risk individuals in transient situations (AMSTAR rating 7/11)	Posted on 6 April 2020 (pre-print; not yet peer-reviewed)
	• Using masks o Supporting correct use	• Healthcare settings o Medical workers o Non-medical workers • Non-healthcare settings o Citizens with confirmed or suspected COVID-19 o All citizens	Masks are essential for front-line workers alongside other PPE, but are not recommended to be worn by all citizens (AMSTAR rating 1/9)	Literature searched 20 March 2020
	• Using masks o Supporting correct use	• Non-healthcare settings o All citizens	No evidence that cloth masks in the community setting prevent viral respiratory illness and may present a risk to the wearer (AMSTAR rating 6/9)	Literature searched 31 March 2020
	• Using masks o Supporting correct use	• Non-healthcare settings o Citizens with confirmed or	Evidence about effectiveness of face masks was based mostly on medical-grade masks and is not sufficiently strong to support widespread use as a protective measure against COVID-19, but there is enough	Literature searched 31 January 2020

		suspected COVID-19 o High-risk citizens o All citizens	evidence to support the use of face masks for short periods of time (e.g., by vulnerable individuals) (AMSTAR rating 7/11)	
	• Conserving masks o Extended use o Use beyond shelf life • Reusing masks o Reusing by the same person without decontaminating o Decontaminating and reusing by the same person	• Healthcare settings o Medical workers	Reprocessing using ultraviolet light germicidal irradiation, vaporous hydrogen peroxide, and heat-based decontamination may be effective for decontaminating for the reuse of N95 masks, and extension of shelf life and extended use may also be options (AMSTAR rating 1/9)	Last updated on 27 April 2020
	• Conserving o Using beyond the recommended duration o Using beyond the recommended shelf life • Reusing o Reusing by the same person without decontaminating	• Healthcare setting o Medical workers	In shortage contexts, extended use of N95 respirators is preferred over reuse, and wearing expired N95 respirators can be considered, after carefully inspecting them (AMSTAR rating 1/9)	Posted 15 April 2020
	• Conserving masks o Using beyond the recommended duration • Reusing masks o Reusing by the same person without decontaminating o Decontaminating and reusing by the same person	• Not applicable (based on laboratory studies)	Limited evidence from laboratory studies supports prioritizing extended use over reuse because N95s may readily spread infection by touch if donned and doffed, and are prone to mechanical failure upon reuse (AMSTAR rating 2/9)	Literature searched on 23 March 2020
	• Reusing masks o Reusing by the same person without decontaminating	• Healthcare settings o Not specified	Microwave irradiation and heat provides safe and effective decontamination options for N95 filtering facepiece respirator reuse during critical shortages, autoclaving masks is	Last updated on 29 March 2020

	○ Decontaminating and reusing by the same person ○ Decontaminating and reusing by others		not recommended, and any mask disinfected using these methods should be inspected for physical degradation before reuse (AMSTAR rating 2/9)	
	• Repurposing ○ Alternative materials	• Healthcare settings ○ Medical workers	The use of cloth masks in healthcare settings might increase the rates of infection, and it should be used as last resort (AMSTAR rating 1/9)	Last search 7 April 2020
	• Producing ○ Fast tracking regulatory processes	• Healthcare setting ○ Medical workers ○ Non-medical workers	No studies were found comparing the equivalence of N95 respirator used in other jurisdictions, whereas the FDA has issued several emergency use authorizations for importing respirators that are approved in other countries AMSTAR score (0/8)	Posted 7 April 2020
Guidelines developed using some type of evidence synthesis and/or expert opinion	• Allocating ○ Efficient allocation • Using ○ Supporting correct use ○ Monitoring for correct use	• Healthcare settings ○ Medical workers ○ Non-medical workers	Strategies must be put in place to address expected or known face-mask shortages (U.S. - Emergency Care Research Institute)	Last updated 22 April 2020
	• Allocating ○ Efficient allocation ○ Stocking practices (including monitoring)	• Healthcare settings ○ Medical workers ○ Non-medical workers	Conventional-, contingency- and crisis-capacity strategies are necessary to optimize the supply of N95 respirators (U.S. CDC)	Last updated 2 April 2020
	• Allocating ○ Efficient allocation	• Healthcare settings ○ Medical workers ○ Non-medical workers	Ethics prioritization guidance on the use of personal protective equipment under critical shortages (Ontario Health Bioethics Table)	Last updated 25 March 2020
	• Allocating ○ Stocking practices (including monitoring) • Conserving ○ Use beyond the recommended duration (extended use)	• Healthcare settings ○ Medical workers	Several strategies can be used to address personal protective equipment, including masks, shortages during a pandemic, from optimizing supplies to conserving and reusing masks (U.S. - Emergency Care Research Institute)	Last updated on 24 March 2020

	• Reusing o Decontaminating and reusing by others			
	• Allocating o Efficient allocation • Using o Supporting correct use o Monitoring for correct use	• Healthcare settings o Medical workers o Non-medical workers • Non-healthcare settings o Essential workers	Three strategies should be used to optimize the availability of personal protective equipment: minimizing the need for PPE, ensuring rational and appropriate use of PPE and coordinating PPE supply-chain management mechanisms (WHO technical guidance)	Last updated 19 March 2020
	• Using o Supporting correct use	• Non-healthcare settings o All citizens	Different guidance is required for the appropriate use in different workplaces and by different employees (Institut national de santé publique du Québec)	Last updated 29 April 2020
	• Using o Supporting correct use	• Healthcare settings o Medical workers o Non-medical workers	Use of PPE by health and social-care workers in the context of COVID-19 pandemic (Public Health England)	Last updated 24 April 2020
	• Using o Supporting correct use • Repurposing o Medical masks	• Non-healthcare settings o Essential workers	Employees should wear a face mask at all times while in the workplace for 14 days after being in contact with a COVID-19 case (U.S. CDC)	Last updated 20 April 2020
	• Using o Supporting correct use • Repurposing o Alternative materials	• Non-healthcare settings o All citizens	Cloth masks (e.g., cotton or gauze) are not recommended under any circumstances to prevent the transmission of respiratory infection in low-risk community settings (Joanna Briggs Institute Evidence Summary)	19 April 2020
	• Using o Supporting correct use	• Non-healthcare settings o All citizens	Risk-informed decision-making guidelines for workplaces and businesses during the COVID-19 pandemic (Government of Canada)	Last updated 17 April 2020
	• Using o Supporting correct use	• Non-healthcare settings o All citizens	Different guidance is required for the appropriate use in communities, schools, workplaces, and events (U.S. CDC)	Last updated 17 April 2020
	• Using o Supporting correct use	• Non-healthcare settings	When worn properly, homemade masks may help reduce the spread of COVID-19 from	16 April 2020

	• Re-purposing o Alternative materials	o All citizens	infected people to non-infected people (Government of Canada)	
	• Using o Supporting correct use • Reusing o Decontaminating and reusing by others • Repurposing o Medical mask o Alternative materials	• Healthcare settings o Medical workers	In making recommendations for conserving N95 supply, the use of homemade masks with full face shield is considered as last resort (U.S. - Emergency Care Research Institute)	Last updated 15 April 2020
	• Using o Supporting correct use • Repurposing o Alternative materials	• Non-healthcare settings o All citizens	It is recommended to wear cloth face coverings in public settings where other social distancing measures are difficult to maintain (e.g., grocery stores and pharmacies) especially in areas of significant community-based transmission (U.S. CDC)	13 April 2020
	• Using o Supporting correct use • Repurposing o Medical masks o Alternative materials	• Non-healthcare settings o All citizens	Precautionary principle drawing on best-available evidence should be used to recommend everyone wear face masks during COVID-19 pandemic (guideline produced by a multi-country team of researchers)	9 April 2020
	• Using o Supporting correct use • Repurposing o Medical mask	• Non-healthcare settings o Essential workers	Medical masks may be worn among professions who have close proximity with other people (e.g., cashiers, police force) when asymptomatic cases are thought to be high (WHO technical guidance)	Last updated 8 April 2020
	• Using o Supporting correct use • Repurposing o Medical masks o Alternative materials	• Non-healthcare settings o All citizens	Non-medical face masks are less effective than medical face masks, and when asymptomatic cases in the community are assumed to be high, masks could be considered in high-risk settings (e.g., taking public transport and visiting busy stores) (European Centre for Disease Prevention and Control)	8 April 2020
	• Using o Supporting correct use	• Non-healthcare settings	There is no current evidence to make a recommendation for or against the use of	6 April 2020

	• Repurposing o Alternative materials	o All citizens	non-medical masks made of other materials (e.g., cotton fabric) in the community setting, and if decision-makers proceed with advising the use of non-medical masks, the features to consider include numbers of layers of fabric/tissue, breathability of material used, water repellence/hydrophobic qualities, shape of mask and fit of mask (WHO technical guidance)	
	• Using o Supporting correct use • Repurposing o Medical mask	• Non-healthcare settings o Essential workers	Some staff working in points of entry at airports, ports and ground crossing should be wearing medical masks (e.g., screeners, interviewers, cleaners) (WHO technical guidance)	Last updated 6 April 2020
	• Using o Supporting correct use • Repurposing o Medical mask o Alternative materials	• Healthcare settings o Medical workers o Non-medical workers • Non-healthcare settings o Essential workers o Citizens with confirmed or suspected COVID-19 o High-risk citizens o All citizens	Medical masks should be reserved for healthcare workers (WHO technical guidance)	Last updated 6 April 2020
	• Using o Supporting correct use • Repurposing o Alternative materials	• Non-healthcare settings o All citizens	Evidence is inconclusive about effectiveness of cloth face coverings worn by the public (U.S. - Emergency Care Research Institute)	6 April 2020
	• Using o Supporting correct use	• Healthcare settings o Medical workers • Non-healthcare settings o All citizens	Different guidance is required for the appropriate use in schools, workplaces, long-term care facilities and institutions (WHO technical guidance)	Last updated April 2020

	• Using o Supporting correct use • Repurposing o Medical masks	• Non-healthcare settings o Essential workers	Medical masks should be worn by front-line workers including police and military (Colleges of Medicines of South Africa)	Last updated 31 March 2020
	• Using o Supporting correct use • Conserving o Use beyond the recommended duration (extended use) • Reusing o Decontaminating and reusing by others	• Healthcare settings o Medical workers	The reuse, or extended use, of masks and respirators designed for single use, may be done in acute healthcare settings under certain circumstances (Joanna Briggs Institute Evidence Summary)	Last updated 31 March 2020
	• Using o Supporting correct use • Repurposing o Medical masks o Alternative materials	• Healthcare settings o Medical workers	A medical/surgical mask should always be worn when providing direct patient care to a patient with known or suspected respiratory infection (Joanna Briggs Institute Evidence Summary)	Last updated 30 March 2020
	• Using o Supporting correct use	• Non-healthcare settings o All citizens	Non-healthcare workers should be trained in the correct use of a surgical mask (Public Health England)	Last updated 26 March 2020
	• Using o Supporting correct use • Repurposing o Medical masks o Alternative materials	• Non-healthcare settings o All citizens	Recommendations for face-mask use among the general public in community settings were inconsistent in a comparison of recommendations from different jurisdictions (multi-country comparison of guidelines)	Published 20 March 2020
	• Using o Supporting correct use • Conserving o Use beyond the recommended duration (extended use)	• All settings and populations	Guidelines for wearing masks (China's Joint Prevention and Control Mechanism of the State Council)	Last updated 17 March 2020
	• Using o Supporting correct use	• Non-healthcare settings o All citizens	Most workers at high or very high exposure risk likely need to wear personal protective equipment, including a face mask or a	Last updated March 2020

			respirator, depending on their job tasks and exposure risks (U.S. Department of Labor and Department of Health & Human Services)	
	• Using o Supporting correct use • Repurposing o Medical mask	• Non-healthcare settings o Essential workers	Medical/surgical mask should be made available in workplaces for workers developing respiratory symptoms including prisons and other places of detention (WHO technical guidance)	Last updated March 2020
	• Using o Supporting correct use • Conserving o Use beyond the recommended duration (extended use)	• Healthcare settings o Medical workers o Non-medical workers • Non-healthcare settings o Essential workers o Citizens with confirmed or suspected COVID-19 o High-risk citizens o All citizens	Guidelines for selection and use of masks to prevent COVID-19 in different populations (China's Joint Prevention and Control Mechanism of the State Council)	Last updated 4 February 2020
	• Producing o Rapid technological innovations	• Healthcare setting o Medical workers • Non-medical workers	List of PPE supply equivalents based on key performance indicators and functional equivalence (U.S. - Emergency Care Research Institute)	Last updated 10 April 2020
	• Using o Supporting correct use	• All populations and settings	Appropriate use and disposal of masks are key for their effectiveness on reducing transmission (WHO technical guidance)	Last updated 6 April 2020
	• Conserving o Use beyond the recommended duration (extended use)	• Healthcare settings o Medical workers	Prolonged use of surgical and filtering face piece masks in the context of a supply shortage should consider tolerance and accessibility, sealing and integrity, and risk of contamination, and that duration of wearing should not exceed four hours for surgical masks and eight hours for FFP masks (French Society for Hospital Hygiene and the	Last updated 23 April 2020

			High Council for Public Health)	
Protocols for reviews that are underway	• Reusing masks o Decontaminating and reusing by the same person o Decontaminating and reusing by others	• Healthcare settings o Medical workers	Efficacy and safety of disinfectants for the decontamination of N95 and SN95 filtering facepiece respirators	Anticipated completion date 06 May 2020
	• Producing masks o Home-based production	• Non-medical settings o All citizens	Evaluating the protective effect of home-made and cloth face masks against viral respiratory illness	Anticipated completion 31 May 2020
	• Producing o Home-based production	• Healthcare settings (medical workers)	Homemade gastroscope isolation mask for preventing and controlling COVID-19 (study protocol)	No anticipated completion date provided
	• Using o Supporting correct use	• Non-healthcare settings o Citizens with confirmed or suspected COVID-19	Physical distancing with or without masks to prevent COVID-19 transmission between patients with confirmed COVID-19 infection and others, including healthcare workers	Anticipated completion date 30 April 2020
Titles/questions for reviews that are being planned	• Producing o Home-based production	• Non-medical settings (all citizens)	Cloth masks for community compared to medical-grade masks or nothing to prevent spread of respiratory viruses	Underway
	• Producing o Home-based production	• Non-medical settings o Essential workers o High-risk citizens o All citizens	Forms of non-standard PPE (e.g., home-made masks) and evidence of their efficacy	Question under review
	• Conserving o Use beyond recommended duration • Reusing	• Medical settings o Medical workers	Challenges associated with reuse and extended use of PPE equipment in the context of COVID-19	Question under review
	• Conserving o Use beyond recommended duration • Reusing	• Medical settings o Medical workers	Reusing or extensively used N95 masks compared to single use of N95 masks in healthcare settings?	Awaiting prioritization to conduct

	• Reusing o Decontaminating and reuse by the same person o Decontaminating and reuse by others	• Medical settings o Medical workers	Efficacy and safety of disinfectants for the decontamination of N95 and SN95 filtering facepiece respirator (FFRs)	Ongoing
	• Reusing o Decontaminating and reuse by the same person o Decontaminating and reuse by others	• Medical settings o Medical workers o Non-medical workers	Decontamination interventions for the reuse of surgical mask personal protective equipment (PPE)	Ongoing
	• Repurposing o Medical masks o Alternative materials	• Medical settings o Medical workers	What is the evidence for the efficacy and safety of masks repurposed from other industries in protecting healthcare staff from COVID-19 infection	Question under review
	• Repurposing o Alternative materials	• Medical settings o Medical workers	What is the efficacy of 'armour-lite' personal protective equipment (PPE) as offered to U.K. primary care staff in the context of COVID-19	Question under review

Appendix 2: Abstracts for highly relevant documents

Note that the table below only includes the abstracts for the documents that we identified on page 1 as being highly relevant to the question.

Type of document	Relevance to question	Abstract and link to full text
Full systematic review	Allocating masks • Efficient allocation	Lack of evidence about use of masks by those not diagnosed with COVID-19 to limit spread **Abstract** Face masks are being used by individuals who are not medically diagnosed with COVID-19 as a means to limit the spread of COVID-19 in several countries around the world. While some countries recommend the use of face masks, other countries do not recommend their use to limit the transmission of COVID-19 among this specific population. Because of contradicting recommendations provided by health authorities of different countries, this paper aims to investigate the availability of scientific evidence on the effectiveness of face-mask use in limiting the spread of COVID-19 among individuals who are not medically diagnosed with COVID-19 through a systematic review search. This paper will further discuss concerns around current recommendations provided to those who are not medically diagnosed with COVID-19 regarding face-mask use in the context of available evidence. To carry out the systematic review on the effectiveness of face-mask use in limiting the spread of COVID-19 among individuals who are not medically diagnosed with COVID-19, databases Cochrane Library, EMBASE, Google Scholar, PubMed, and Scopus were searched for relevant studies. Two groups of keywords were combined: those relating to face masks and COVID-19. The systematic review search did not find any studies that investigated the effectiveness of face-mask use in limiting the spread of this specific virus, COVID-19, among this specific population, those who are not medically diagnosed with COVID-19. In light of the finding of this systematic review search, which is a lack of scientific evidence on the effectiveness of face masks in limiting the spread of COVID-19 among those who are not medically diagnosed with COVID-19, the significance of this finding is highlighted and extensively discussed in this paper. This paper calls for, but does not limit to; 1) evidence-based recommendations; 2) considerations when providing recommendations in the absence of evidence; 3) evidence and knowledge transparency on current recommendations with the public; 4) global alignment on recommendations; and 5) further research.
	Reusing • Decontaminating and reuding by the same person or by others	Vaporized hydrogen peroxide successfully decontaminates N95 facepiece respirators, whereas alcohol or sodium hypochlorite are not recommended **Abstract** Background: Decontaminating and re-using filtering facepiece respirators (FFR) for healthcare workers is a potential solution to address inadequate FFR supply during a global pandemic. Aim: The

Type of document	Relevance to question	Abstract and link to full text
		objective of this review was to synthesize existing data on the effectiveness and safety of using chemical disinfectants to decontaminate N95 FFR. Methods: We conducted a systematic review on disinfectants to decontaminate N95 FFRs using Embase, Medline, Global Health, Google Scholar, WHO feed, and MedRxiv. Two reviewers independently determined study eligibility and extracted and verified predefined data fields. Original research reporting on N95 FFR function, decontamination, physical appearance, safety, or mask fit following decontamination with a disinfectant was included. Findings and Conclusions: A single cycle of vaporized hydrogen peroxide successfully removes infectious pathogens without affecting mask function or fit, and with little change in FFR physical appearance. Residual hydrogen peroxide levels following decontamination were below the safety limit. More than one decontamination cycle of vaporized hydrogen peroxide may be possible but further information is required on how multiple cycles would affect mask fit in a real world setting before the upper limit can be established. Although immersion in liquid hydrogen peroxide does not appear to adversely affect mask function, there is no available data on its ability to remove infectious pathogens from FFRs or its impact on mask fit. Sodium hypochlorite, ethanol, isopropyl alcohol and EtO are not recommended due to safety concerns or negative effects on mask function.
	Using masks • Supporting correct use	Long and frequently changing guidelines make it difficult for staff to adhere to best practices in infection control and prevention **Abstract** Background: This review is one of a series of rapid reviews that Cochrane contributors have prepared to inform the 2020 COVID-19 pandemic. When new respiratory infectious diseases become widespread, such as during the COVID-19 pandemic, healthcare workers' adherence to infection prevention and control (IPC) guidelines becomes even more important. Strategies in these guidelines include the use of personal protective equipment (PPE) such as masks, face shields, gloves and gowns; the separation of patients with respiratory infections from others; and stricter cleaning routines. These strategies can be difficult and time-consuming to adhere to in practice. Authorities and healthcare facilities therefore need to consider how best to support healthcare workers to implement them. Objectives: To identify barriers and facilitators to healthcare workers' adherence to IPC guidelines for respiratory infectious diseases. Search methods: We searched OVID MEDLINE on 26 March 2020. As we searched only one database due to time constraints, we also undertook a rigorous and comprehensive scoping exercise and search of the reference lists of key papers. We did not apply any date limit or language limits. Search criteria: We included qualitative and mixed-methods studies (with a distinct qualitative component) that focused on the experiences and perceptions of healthcare workers towards factors that impact on their ability to adhere to IPC guidelines for respiratory infectious diseases. We included studies of any type of healthcare worker with responsibility for patient care. We included studies that focused on IPC guidelines (local, national or international) for

Type of document	Relevance to question	Abstract and link to full text
		respiratory infectious diseases in any healthcare setting. These selection criteria were framed by an understanding of the needs of health workers during the COVID-19 pandemic. Data collection and analysis: Four review authors independently assessed the titles, abstracts and full texts identified by our search. We used a prespecified sampling frame to sample from the eligible studies, aiming to capture a range of respiratory infectious disease types, geographical spread and data-rich studies. We extracted data using a data extraction form designed for this synthesis. We assessed methodological limitations using an adapted version of the Critical Skills Appraisal Programme (CASP) tool. We used a 'best fit framework approach' to analyse and synthesise the evidence. This provided upfront analytical categories, with scope for further thematic analysis. We used the GRADE-CERQual (Confidence in the Evidence from Reviews of Qualitative research) approach to assess our confidence in each finding. We examined each review finding to identify factors that may influence intervention implementation and developed implications for practice. Main results: We found 36 relevant studies and sampled 20 of these studies for our analysis. Ten of these studies were from Asia, four from Africa, four from Central and North America and two from Australia. The studies explored the views and experiences of nurses, doctors and other healthcare workers when dealing with severe acute respiratory syndrome (SARS), H1N1, MERS (Middle East respiratory syndrome), tuberculosis (TB), or seasonal influenza. Most of these healthcare workers worked in hospitals; others worked in primary and community care settings. Our review points to several barriers and facilitators that influenced healthcare workers' ability to adhere to IPC guidelines. The following factors are based on findings assessed as of moderate to high confidence. Healthcare workers felt unsure as to how to adhere to local guidelines when they were long and ambiguous or did not reflect national or international guidelines. They could feel overwhelmed because local guidelines were constantly changing. They also described how IPC strategies led to increased workloads and fatigue, for instance because they had to use PPE and take on additional cleaning. Healthcare workers described how their responses to IPC guidelines were influenced by the level of support they felt that they received from their management team. Clear communication about IPC guidelines was seen as vital. But healthcare workers pointed to a lack of training about the infection itself and about how to use PPE. They also thought it was a problem when training was not mandatory. Sufficient space to isolate patients was also seen as vital. A lack of isolation rooms, anterooms and shower facilities was a problem. Other important practical measures described by healthcare workers included minimising overcrowding, fast-tracking infected patients, restricting visitors, and providing easy access to handwashing facilities. A lack of PPE, and equipment that was of poor quality, was a serious concern for healthcare workers and managers. They also pointed to the need to adjust the volume of supplies as infection outbreaks continued. Healthcare workers believed that they followed IPC guidance more closely when they saw the value of it. Some healthcare workers felt motivated to follow the guidance because of fear of infecting themselves or their families, or because they felt responsible for their patients. Some healthcare workers found it

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		difficult to use masks and other equipment when it made patients feel isolated, frightened or stigmatised. Healthcare workers also found masks and other equipment uncomfortable to use. The workplace culture could also influence whether healthcare workers followed IPC guidelines or not. Across many of the findings, healthcare workers pointed to the importance of including all staff, including cleaning staff, porters, kitchen staff and other support staff when implementing IPC guidelines.
	Conserving masks • Use beyond the recommended duration • Use beyond recommended shelf life Reusing masks • Decontaminating and re-using by the same person • Decontaminating and reusing by others	Using standard PPE and providing training for donning and doffing masks reduces contamination from highly infectious diseases **Abstract** Background: In epidemics of highly infectious diseases, such as Ebola, severe acute respiratory syndrome (SARS), or coronavirus (COVID-19), healthcare workers (HCW) are at much greater risk of infection than the general population, due to their contact with patients' contaminated body fluids. Personal protective equipment (PPE) can reduce the risk by covering exposed body parts. It is unclear which type of PPE protects best, what is the best way to put PPE on (i.e. donning) or to remove PPE (i.e. doffing), and how to train HCWs to use PPE as instructed. Objectives: To evaluate which type of full-body PPE and which method of donning or doffing PPE have the least risk of contamination or infection for HCW, and which training methods increase compliance with PPE protocols. Search methods: We searched CENTRAL, MEDLINE, Embase and CINAHL to 20 March 2020. Selection criteria: We included all controlled studies that evaluated the effect of full-body PPE used by HCW exposed to highly infectious diseases, on the risk of infection, contamination, or noncompliance with protocols. We also included studies that compared the effect of various ways of donning or doffing PPE, and the effects of training on the same outcomes. Data collection and analysis: Two review authors independently selected studies, extracted data and assessed the risk of bias in included trials. We conducted random-effects meta-analyses were appropriate. Main results: Earlier versions of this review were published in 2016 and 2019. In this update, we included 24 studies with 2278 participants, of which 14 were randomised controlled trials (RCT), one was a quasi-RCT and nine had a non-randomised design. Eight studies compared types of PPE. Six studies evaluated adapted PPE. Eight studies compared donning and doffing processes and three studies evaluated types of training. Eighteen studies used simulated exposure with fluorescent markers or harmless microbes. In simulation studies, median contamination rates were 25% for the intervention and 67% for the control groups. Evidence for all outcomes is of very low certainty unless otherwise stated because it is based on one or two studies, the indirectness of the evidence in simulation studies and because of risk of bias. The use of a powered, air-purifying respirator with coverall may protect against the risk of contamination better than a N95 mask and gown (risk ratio (RR) 0.27, 95% confidence interval (CI)

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		0.17 to 0.43) but was more difficult to don (non-compliance: RR 7.5, 95% CI 1.81 to 31.1). In one RCT (59 participants), people with a long gown had less contamination than those with a coverall, and coveralls were more difficult to doff (low-certainty evidence). Gowns may protect better against contamination than aprons (small patches: mean difference (MD) −10.28, 95% CI −14.77 to −5.79). PPE made of more breathable material may lead to a similar number of spots on the trunk (MD 1.60, 95% CI −0.15 to 3.35) compared to more water-repellent material, but may have greater user satisfaction (MD −0.46, 95% CI −0.84 to −0.08, scale of 1 to 5). The following modifications to PPE design may lead to less contamination compared to standard PPE: sealed gown and glove combination (RR 0.27, 95% CI 0.09 to 0.78), a better fitting gown around the neck, wrists and hands (RR 0.08, 95% CI 0.01 to 0.55), a better cover of the gown-wrist interface (RR 0.45, 95% CI 0.26 to 0.78, low-certainty evidence), added tabs to grab to facilitate doffing of masks (RR 0.33, 95% CI 0.14 to 0.80) or gloves (RR 0.22, 95% CI 0.15 to 0.31). Using Centers for Disease Control and Prevention (CDC) recommendations for doffing may lead to less contamination compared to no guidance (small patches: MD −5.44, 95% CI −7.43 to −3.45). One-step removal of gloves and gown may lead to less bacterial contamination (RR 0.20, 95% CI 0.05 to 0.77) but not to less fluorescent contamination (RR 0.98, 95% CI 0.75 to 1.28) than separate removal. Double-gloving may lead to less viral or bacterial contamination compared to single gloving (RR 0.34, 95% CI 0.17 to 0.66) but not to less fluorescent contamination (RR 0.98, 95% CI 0.75 to 1.28). Additional spoken instruction may lead to fewer errors in doffing (MD −0.9, 95% CI −1.4 to −0.4) and to fewer contamination spots (MD −5, 95% CI −8.08 to −1.92). Extra sanitation of gloves before doffing with quaternary ammonium or bleach may decrease contamination, but not alcohol-based hand rub. The use of additional computer simulation may lead to fewer errors in doffing (MD −1.2, 95% CI −1.6 to −0.7). A video lecture on donning PPE may lead to better skills scores (MD 30.70, 95% CI 20.14 to 41.26) than a traditional lecture. Face-to-face instruction may reduce noncompliance with doffing guidance more (odds ratio 0.45, 95% CI 0.21 to 0.98) than providing folders or videos only.
	Using masks • Supporting correct use	Preservation of N95 respirators for high-risk procedures should be considered when in short supply **Abstract** BACKGROUND: Respiratory protective devices are critical in protecting against infection in health care workers at high risk of novel 2019 coronavirus disease (COVID-19); however, recommendations are conflicting and epidemiological data on their relative effectiveness against COVID-19 are limited. PURPOSE: To compare medical masks to N95 respirators in preventing laboratory confirmed viral infection and respiratory illness including coronavirus specifically in health care workers. DATA SOURCES: MEDLINE, Embase and CENTRAL from January 1(st) 2014 to March 9(th) 2020. Update of published search conducted from January 1(st) 1990 to December 9(th) 2014. STUDY

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		SELECTION: Randomized controlled trials (RCTs) comparing the protective effect of medical masks to N95 respirators in health care workers. DATA EXTRACTION: Reviewer pair independently screened, extracted data, and assessed risk of bias and the certainty of the evidence. DATA SYNTHESIS: Four RCTs were meta-analysed adjusting for clustering. Compared to N95 respirators; the use of medical masks did not increase laboratory confirmed viral (including coronaviruses) respiratory infection (OR 1.06; 95% CI 0.90-1.25; I(2) =0%; low certainty in the evidence) or clinical respiratory illness (OR 1.49; 95%CI 0.98-2.28; I(2) =78%; very low certainty in the evidence). Only one trial evaluated coronaviruses separately and found no difference between the two groups (p=0.49). LIMITATIONS: Indirectness and imprecision of available evidence. CONCLUSIONS: Low certainty evidence suggests that medical masks and N95 respirators offer similar protection against viral respiratory infection including coronavirus in health care workers during non-aerosol generating care. Preservation of N95 respirators for high-risk, aerosol generating procedures in this pandemic should be considered when in short supply.
	Using masks • Supporting correct use	Standard surgical masks are as effective as N95 for preventing infection of healthcare workers **Key findings** Standard surgical masks are as effective as respirator masks (e.g. N95, FFP2, FFP3) for preventing infection of healthcare workers in outbreaks of viral respiratory illnesses such as influenza. No head-to-head trial of these masks in COVID-19 has yet been published, and neither type of mask prevents all infection. Both types of masks need to be used in combination with other PPE measures. Respirator masks are recommended for protection during aerosol generating procedures (AGPs). Rapid reviews on wider PPE measures, and what counts as an AGP, are ongoing.
	Conserving masks • Use beyond recommended duration • Use beyond recommended shelf life Reusing masks • Decontaminating and reusing by the same person	Decontaminating using ultraviolet light germicidal irradiation, vaporous hydrogen peroxide, and heat-based decontamination as well as extending the use and shelf life of N95 masks may support overcoming supply shortages **Abstract** Within the context of the COVID-19 pandemic, N95 respirator mask supply shortages are being experienced; there are several ways of optimizing N95 respirator mask supply. Health Canada is accepting applications from reprocessors and manufacturers of reprocessing devices, and has stated that Canada's approach will align internationally, including with the US FDA's intended approach for Emergency Use Authorization for masks and respirators.[1] With the rapidly changing environment, new technologies may be approved for reprocessing. Any method used for reprocessing should incorporate standard protocols. Reprocessing using ultraviolet light germicidal irradiation (UVGI), vaporous hydrogen products, and heat-based decontamination may be effective methods of

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	• Decontaminating and reusing by others	decontamination for the reuse of N95 respirator masks. Alternative sourcing of N95 respirator masks (e.g., beyond shelf life) and extended use may also be an option.
	Reusing masks • Decontaminating and reusing by the same person • Decontaminating and reusing by others	Ultraviolet light germicidal irradiation can restore N95 masks to certification standards of the National Institute for Occupation Safety and Health (U.S.) **Abstract** Background: Inadequate supply of filtering facepiece respirators (FFR) for healthcare workers during a global pandemic such as the novel coronavirus outbreak (SARS-CoV-2) is a serious public health issue. Aim: The objective of this review was to synthesize existing data on the effectiveness of ultraviolet germicidal irradiation (UVGI) on N95 FFR decontamination. Methods: We conducted a systematic review on UVGI in N95 FFRs by using Embase, Medline, Global Health, Google Scholar, WHO feed, and MedRxiv. Two reviewers independently determined study eligibility and extracted and verified predefined data fields. Original research reporting on N95 FFR function, decontamination, or mask fit following UVGI were included. Findings and Conclusions: Twelve studies were identified, comprising of 53 different UVGI intervention arms and 43 N95 FFR models. In all cases, FFRs maintained National Institute for Occupational Safety and Health (NIOSH) certification standards following UVGI. Aerosol penetration averaged 1.19% (0.70-2.48%) and 1.14% (0.57-2.63%) for control and UVGI arms respectively. Airflow resistance for the control arms averaged 9.79 mm H2O (7.97-11.70 mm H2O) vs 9.85 mm H2O (8.33-11.44 mm H2O) for UVGI treatment arms. All UVGI protocols employing a cumulative dose >20,000 J/m2 resulted in a 2 log reduction in viral load. A >3 log reduction was observed in 7 UVIG arms using a dose >40,000 J/m2. Impact of UVIG on fit was evaluated in two studies (16,200; 32,400 J/m2) and did not find evidence of compromise. Altogether, our findings suggest that further work in this area should use a cumulative UV-C dose of 40,000 J/m2 or greater, and confirm appropriate mask fit following decontamination.
Rapid reviews	Producing masks • Rapid technological innovations	Very limited evidence on effectiveness of 3D-printed N95 respirators and face shields and many health authorities emphasized that 3D-printed N95 respirators may not provide the same fluid barrier and air filtration protection **Key messages** This supplemental information was generated to support decision-making and to provide information on 3D printing of N95 respirators and face shields during the novel coronavirus disease (COVID-19) pandemic. We examined the recommendations from national and international health authorities and organizations and completed a targeted search of published literature to determine what is known around 3D printing of N95 respirators and face shields. We found the following.

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		• There is very limited evidence on effectiveness; only some models/designs have been tested in a clinical setting (see table below) • Guidance from national and international health authorities emphasize that 3D-printed N95 respirators may not provide the same fluid barrier and air filtration protection • Guidance from national and international health authorities emphasize that 3D-printed face shields need to provide adequate coverage and fit snugly in order to provide protection
	Using masks • Supporting correct use	Evidence not strong enough to recommend universal wearing of masks, but may be slightly protective against infection from casual community contact, modestly effective against household infections when both infected and non-infected people wear them, and useful for high-risk individuals in transient situations **Abstract** The current pandemic of COVID-19 has lead to conflicting opinions on whether wearing facemasks outside of health care facilities protects against the infection. To better understand the value of wearing facemasks we undertook a rapid systematic review of existing scientific evidence about development of respiratory illness, linked to use of facemasks in community settings. METHODS: We included all study designs. There were 31 eligible studies (including 12 RCTs). Narrative synthesis and random-effects meta-analysis of attack rates for primary and secondary prevention in 28 studies were performed. Results were reported by design, setting and type of face barrier in primary prevention, and by who wore the facemask (index patient or well contacts) in secondary prevention trials. The preferred outcome was influenza-like illness (ILI) but similar outcomes were pooled with ILI when ILI was unavailable. GRADE quality assessment was based on RCTs with support from observational studies. RESULTS: Where specific information was available, most studies reported about use of medical grade (surgical paper masks). In 3 RCTs, wearing a facemask may very slightly reduce the odds of developing ILI/respiratory symptoms, by around 6% (OR 0.94, 95% CI 0.75 to 1.19, I2 29%, low certainty evidence). Greater effectiveness was suggested by observational studies. When both house-mates and an infected household member wore facemasks the odds of further household members becoming ill may be modestly reduced by around 19% (OR 0.81, 95%CI 0.48 to 1.37, I 2 45%, 5 RCTs, low certainty evidence). The protective effect was very small if only the well person (OR 0.93, 95% CI 0.68 to 1.28, I2 11%, 2 RCTs, low uncertainty evidence) or the infected person wore the facemask (very low certainty evidence). DISCUSSION: Based on the RCTs we would conclude that wearing facemasks can be very slightly protective against primary infection from casual community contact, and modestly protective against household infections when both infected and uninfected members wear facemasks. However, the RCTs often suffered from poor compliance and controls using facemasks. Across observational studies the evidence in favour of wearing facemasks

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		was stronger. We expect RCTs to under-estimate the protective effect and observational studies to exaggerate it. The evidence is not sufficiently strong to support widespread use of facemasks as a protective measure against COVID-19. However, there is enough evidence to support the use of facemasks for short periods of time by particularly vulnerable individuals when in transient higher risk situations. Further high-quality trials are needed to assess when wearing a facemask in the community is most likely to be protective.
	Using masks • Supporting correct use	No evidence that cloth masks in the community setting prevent viral respiratory illness and may present a risk to the wearer **Key findings** • No trials exist which compare cloth masks to medical masks of nil covering in the community setting • A single, large, well-conducted cluster trial in 15 hospitals in Vietnam compared respiratory infection in healthcare workers wearing cloth masks compared with medical masks for a five-week period • These results were assessed for relevance to the community setting • There is moderate certainty evidence that clinical and laboratory-confirmed respiratory infections are increased approximately 1.5 times when wearing cloth masks compared with medical masks • 28 more people per 1,000 may develop clinical respiratory infections if they wear a cloth mask compared to a medical mask. This could be 0 to 71 fewer per 1,000 more infections • 22 more people per 1,000 may develop laboratory-confirmed respiratory infections if they wear a cloth mask compared to a medical mask. This could be 2 to 63 fewer per 1,000 more infections • There is very low certainty evidence that influenza-like illness is increased approximately 1.6 times when wearing cloth masks compared with medical masks. The uncertainty is due to the low rate of influenza-like infections observed in the trial • Compliance with wearing masks and levels of discomfort are similar in both groups
	Using masks • Supporting correct use	Evidence about effectiveness of face masks was based mostly on medical-grade masks and is not sufficiently strong to support widespread use as a protective measure against COVID-19, but there is enough evidence to support the use of face masks for short periods of time (e.g., by vulnerable individuals) **Abstract** The current pandemic of COVID-19 has lead to conflicting opinions on whether wearing facemasks outside of health care facilities protects against the infection. To better understand the value of

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		wearing facemasks we undertook a rapid systematic review of existing scientific evidence about development of respiratory illness, linked to use of facemasks in community settings. Methods: We included all study designs. There were 31 eligible studies (including 12 RCTs). Narrative synthesis and random-effects meta-analysis of attack rates for primary and secondary prevention in 28 studies were performed. Results were reported by design, setting and type of face barrier in primary prevention, and by who wore the facemask (index patient or well contacts) in secondary prevention trials. The preferred outcome was influenza-like illness (ILI) but similar outcomes were pooled with ILI when ILI was unavailable. GRADE quality assessment was based on RCTs with support from observational studies. Results: Where specific information was available, most studies reported about use of medical grade (surgical paper masks). In 3 RCTs, wearing a facemask may very slightly reduce the odds of developing ILI/respiratory symptoms, by around 6% (OR 0.94, 95% CI 0.75 to 1.19, I2 29%, low-certainty evidence). Greater effectiveness was suggested by observational studies. When both housemates and an infected household member wore facemasks the odds of further household members becoming ill may be modestly reduced by around 19% (OR 0.81, 95%CI 0.48 to 1.37, I2 45%, 5 RCTs, low certainty evidence). The protective effect was very small if only the well person (OR 0.93, 95% CI 0.68 to 1.28, I2 11%, 2 RCTs, low uncertainty evidence) or the infected person wore the facemask (very low certainty evidence). Discussion: Based on the RCTs we would conclude that wearing facemasks can be very slightly protective against primary infection from casual community contact, and modestly protective against household infections when both infected and uninfected members wear facemasks. However, the RCTs often suffered from poor compliance and controls using facemasks. Across observational studies the evidence in favour of wearing facemasks was stronger. We expect RCTs to under-estimate the protective effect and observational studies to exaggerate it. The evidence is not sufficiently strong to support widespread use of facemasks as a protective measure against COVID-19. However, there is enough evidence to support the use of facemasks for short periods of time by particularly vulnerable individuals when in transient higher risk situations. Further high quality trials are needed to assess when wearing a facemask in the community is most likely to be protective.
	Conserving masks • Extended use Use beyond shelf life Reusing masks	Reprocessing using ultraviolet light germicidal irradiation, vaporous hydrogen peroxide, and heat-based decontamination may be effective for decontaminating for the reuse of N95 masks, and extension of shelf life and extended use may also be options Bottom Line: Based on the evidence available as of April 17, 2020.

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	• Reusing by the same person without decontaminating • Decontaminating and reusing by the same person	• Within the context of the COVID-19 pandemic, N95 respirator mask supply shortages are being experienced; there are several ways of optimizing N95 respirator mask supply. • Health Canada is accepting applications from reprocessors and manufacturers of reprocessing devices, and has stated that Canada's approach will align internationally, including with the U.S. FDA's intended approach for Emergency Use Authorization for masks and respirators. • With the rapidly changing environment, new technologies may be approved for reprocessing. Any method used for reprocessing should incorporate standard protocols. • Reprocessing using ultraviolet light germicidal irradiation (UVGI), vaporous hydrogen peroxide, and heat-based decontamination may be effective methods of decontamination for the reuse of N95 respirator masks. • Alternative sourcing of N95 respirator masks (e.g., beyond shelf life) and extended use may also be an option. • Much of the evidence available is based on the Centers for Disease Control and Prevention (CDC) recommendations and ECRI reports.
	Conserving masks • Extended use Reusing masks • Reusing by the same person without decontaminating • Decontaminating and reusing by the same person	Limited evidence from laboratory studies supports prioritizing extended use over reuse because N95s may readily spread infection by touch if donned and doffed, and are prone to mechanical failure upon reuse Published clinical studies are not available to assess the safety of N95 reuse and extended use during critical shortages, so we examined 21 laboratory studies because they may provide at least some rational basis for actions during a crisis. Also, clinical studies are likely unavailable and infeasible because of major ethical and logistical barriers since N95 reuse/extended-use practices are associated with sporadic, unpredictable, variable crisis situations. Nonetheless, limited evidence from laboratory studies supports prioritizing extended use over reuse because N95s may readily spread infection by touch if donned and doffed, and are prone to mechanical failure upon reuse. Studies testing more than 30 respirator N95 models found that covering respirators with surgical masks had no clinically significant effect on breathing effort and gas exchange. Decontamination of N95 respirators by steam, disinfectants (e.g., bleach, hydrogen peroxide vapor), or ultraviolet germicidal irradiation (UVGI) may be safe and effective in some settings, but each method needs to be tested on each model because model materials vary. The available studies support prioritizing N95 extended use over reuse because of the following: • The reported pathogen transfer risk from N95s is high by contact (donning and doffing) but low by aerosol (spread by breathing through a used mask).

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		• Use of surgical masks or similar disposable covers over N95s during extended use are unlikely to result in significant adverse effects. • Mechanical failure (e.g., broken straps and poor sealing between the mask and the user's face) with only a few reuses was common across FDA-cleared (i.e., for medical use) N95s. • Commonly effective disinfection methods can achieve adequate disinfection, with some filter performance loss. Evidence limitations: Laboratory studies may not reflect risks and outcomes in actual clinical settings. Most findings were reported in single studies and may not fully generalize across different N95 models and testing protocols. Results varied significantly across cleaning methods and N95 models and therefore need more validation. Circumstantial validation of the reviewed findings during times of crisis by manufacturers and government evidence, even in a limited capacity, would be of great value in helping healthcare provider and policymaker decisions.
	Reusing masks • Reusing by the same person without decontaminating • Decontaminating and reusing by the same person • Decontaminating and reusing by others	Microwave irradiation and heat provides safe and effective decontamination options for N95 filtering facepiece respirator reuse during critical shortages, autoclaving masks is not recommended, and any mask disinfected using these methods should be inspected for physical degradation before reuse **Abstract** Background: In pandemic situations such as COVID-19, shortages of proper protective equipment are common. One solution may be to decontaminate equipment such as facemasks for reuse. Aim: The aim of this review was to collect and synthesize existing information on decontamination of N95 filtering facepiece respirators (FFRs) using microwave and heat-based treatments, with special attention to impact on mask function (aerosol penetration, airflow resistance) and fit. Methods: A systematic review (PROSPERO ID pending) of literature available on Medline, Embase, Global Health, JISRP and JEFF was conducted. Records were screened independently by two reviewers, and data was extracted and analyzed from studies that reported on the effects of microwave- or heat-based decontamination on N95 FFR performance and/or microbial load. Results: All interventions successfully destroyed viral/bacterial contaminants. Other than autoclaving, which significantly increased aerosol penetration, moist and dry microwave and heat conditions did not significantly impact functional parameters or fit. However, several conditions caused physical damage to at least one N95 model. Conclusions: Microwave irradiation and heat provides safe and effective decontamination options for N95 FFR reuse during critical shortages. However, autoclaving masks is not recommended by the evidence in this review. Any mask disinfected using these methods should be inspected for physical degradation before reuse.

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	Repurposing masks • Alternative materials	The use of cloth masks in healthcare settings might increase the rates of infection, and it should be used as last resort (AMSTAR rating 1/9) **Key messages** This supplemental information was generated to support decision-making and to provide information on cloth (fabric) masks during the novel coronavirus disease (COVID-19) pandemic. We examined the recommendations from national and international health authorities and organizations and completed a targeted search of published literature. We found the following: • Only one randomized trial assessed cloth masks in a healthcare setting and found significantly higher rates of infection in the cloth-mask group compared with the medical-mask group. Guidance advises that cloth masks should be last resort in a healthcare setting.
Guidelines developed using some type of evidence synthesis and/or expert opinion	Allocating masks • Efficient allocation • Stocking practices (including monitoring)	Conventional-, contingency- and crisis-capacity strategies are necessary to optimize the supply of N95 respirators (U.S. CDC) Summary of Updates as of April 2, 2020: • Conventional capacity strategies o Edited the section on use of airborne infection isolation rooms (AIIRs) for aerosol-generating procedures performed on patients with confirmed or suspected COVID-19 patients. o Added language on FDA's Emergency Use Authorization (EUA) authorizing the use of certain NIOSH-approved respirator models in healthcare settings to the section on N95 alternatives. • Contingency capacity strategies o Added a section on temporarily suspending annual fit testing following updated guidance from OSHA. o Added more details in the extended-use section. • Crisis capacity strategies o Added language on the use of respirators approved under international standards and updated the tables. o Combined sections on limited reuse of N95 respirators for tuberculosis and then COVID-19 patients. Added more details surrounding limited reuse.
	Allocating masks • Stocking practices (including monitoring) Conserving	Several strategies can be used to address personal protective equipment, including masks, shortages during a pandemic from optimizing supplies to conserving and reusing masks (U.S. - Emergency Care Research Institute) **Abstract**

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	• Use beyond the recommended duration (extended use) Reusing • Decontamination and reusing by others	Several primary care practices recently contacted ECRI with concerns about personal protective equipment (PPE) shortages during the COVID-19 (coronavirus) outbreak. Specifically, practices are concerned about running out of supplies of masks and N95 respirators. In our response, we recommend working with the practice's local and/or state public health department for immediate assistance as a first option. The National Association of County and City Health Officials provides a searchable directory of local health departments on its website. The Centers for Disease Control and Prevention (CDC) provides guidance on Strategies for Optimizing the Supply of PPE, including healthcare personnel use of homemade masks (please note that CDC states this is "a last resort" and that "homemade masks are not PPE"; see CDC guidance for additional details), Strategies for Optimizing the Supply of N95 Respirators: Crisis/Alternate Strategies, and recommendations for extended use and reuse of N95 respirators. See also the recording of ECRI's March 25, 2020, program COVID-19 and Medical Devices: Safe Respirator Usage When Supplies Are Short; around 18 minutes into the program, ECRI addresses considerations surrounding the N-95 respirator shortage. Primary care practices may consider reaching out to local ambulatory surgery centers, medical spas, and dental practices that have temporarily ceased operations or postponed elective procedures and nonurgent visits to ask if they would be willing to donate supplies. Local colleges and universities may also have supplies they would be willing to donate from their medical and nursing schools or other allied health programs. The 100 Million Mask Challenge is a platform that provides resource information for hospitals, clinicians, and health systems. The platform is in the process of engaging a national partner to facilitate support from manufacturers and the business community to help build up the supply of PPE.
	Using masks • Supporting correct use Repurposing • Alternative materials	Cloth masks (e.g. cotton or gauze) are not recommended under any circumstances to prevent the transmission of respiratory infection in low-risk community settings (Joanna Briggs Institute Evidence Summary) **Best practice recommendations** • A multifaceted approach (e.g., the use of masks during high risk exposure and the practice of evidence-based hand hygiene techniques) to prevent the transmission of respiratory infection in the community is recommended. (Grade A) • The wearing of masks or respirators by uninfected persons in the general community are not recommended. (Grade B)

Type of document	Relevance to question	Abstract and link to full text
		• A mask may be worn by persons at high risk of exposure (e.g. persons living in a household with an infected individual). (Grade B) • Masks should be changed immediately when they become damp. (Grade B) • Single use masks should be discarded immediately and never re-used. (Grade B) • If a mask is worn, it should be placed to cover the mouth and nose and tied securely to minimize any gaps. (Grade B) • The mask should not be touched while wearing or when removing; if inadvertently touching the mask, hands must be immediately cleaned with soap and water, or alcohol-based hand rub. (Grade B) • Cloth (e.g. cotton or gauze) masks are not recommended under any circumstances, to prevent the transmission of respiratory infection in low-risk community settings. (Grade B)
	Using masks • Supporting correct use Repurposing masks • Alternative materials	There is no current evidence to make a recommendation for or against the use of non-medical masks made of other materials (e.g., cotton fabric) in the community setting, and if decision-makers proceed with advising the use of non-medical masks, the features to consider include numbers of layers of fabric/tissue, breathability of material used, water repellence/hydrophobic qualities, shape of mask and fit of mask (WHO) **Abstract** This document provides advice on the use of masks in communities, during home care, and in health care settings in areas that have reported cases of COVID-19. It is intended for individuals in the community, public health and infection prevention and control (IPC) professionals, health care managers, health care workers (HCWs), and community health workers. This updated version includes a section on Advice to decision makers on the use of masks for healthy people in community settings.
	Using masks • Supporting correct use Repurposing masks • Medical mask	Some staff working in points of entry at airports, ports and ground crossing should be wearing medical masks (e.g., screeners, interviewers, cleaners) (WHO) **Abstract** This document summarizes WHO's recommendations for the rational use of personal protective equipment (PPE) in health care and home care settings, as well as during the handling of cargo; it also assesses the current disruption of the global supply chain and considerations for decision making during severe shortages of PPE.
	Using masks • Supporting correct use Repurposing	Medical masks should be reserved for healthcare workers (WHO) **Abstract**

Type of document	Relevance to question	Abstract and link to full text
	• Medical mask • Alternative materials	This document provides advice on the use of masks in communities, during home care, and in health care settings in areas that have reported cases of COVID-19. It is intended for individuals in the community, public health and infection prevention and control (IPC) professionals, health care managers, health care workers (HCWs), and community health workers. This updated version includes a section on Advice to decision makers on the use of masks for healthy people in community settings.
	Using masks • Supporting correct use Repurposing • Alternative materials	Evidence is inconclusive about effectiveness of cloth face coverings worn by the public (U.S. - Emergency Care Research Institute) **Abstract** Cloth face coverings, combined with good hand hygiene and social distancing, are intended to reduce the transmission risk of viral respiratory infection in the general population during an outbreak. In light of the COVID-19 outbreak, the U.S. Centers for Disease Control and Prevention (CDC) recommend the general population wear cloth face coverings in public spaces where social distancing is difficult (e.g., grocery stores, pharmacies). Cloth face coverings include any reusable, washable garments, such as hand-sewn masks, scarves, bandanas, and commercially available biking and pollution masks. This report focuses on the general public's use of these face coverings for reducing the transmission risk of viral respiratory infection.
	Using masks • Supporting correct use Repurposing • Medical masks	Medical masks should be worn by front-line workers including police and military (Colleges of Medicines of South Africa) **Key messages** • COVID-19 is caused by the SARS-CoV-2 virus and spreads from person-to-person through respiratory droplets produced when an infected person coughs or sneezes, and from touching contaminated surfaces. • Close contact with infected people should be avoided, and the risk of transmission mitigated using infection prevention and control measures, including personal protective equipment (PPE) such as face masks. • The pandemic has led to a global shortage of PPE, including masks and respirators. Masks are critical in healthcare settings to protect healthcare workers from becoming infected, and are being widely promoted in community settings to prevent transmission in the general population. This is particularly relevant with SARS-CoV-2, since transmission prior to symptom onset is thought to be important. • Homemade or cloth masks have been used in several settings prior to the COVID-19 pandemic, and have been suggested as a stopgap in community settings in order to save medical masks for use in healthcare workers. The evidence for their effectiveness, however, is unclear.

Type of document	Relevance to question	Abstract and link to full text
	Using masks • Supporting correct use	Non-healthcare workers should be trained in the correct use of a surgical mask (Public Health England) **Key messages** • Cleaning an area with normal household disinfectant after someone with suspected coronavirus (COVID-19) has left will reduce the risk of passing the infection on to other people • Wear disposable or washing-up gloves and aprons for cleaning. These should be double-bagged, then stored securely for 72 hours then thrown away in the regular rubbish after cleaning is finished • Using a disposable cloth, first clean hard surfaces with warm soapy water. Then disinfect these surfaces with the cleaning products you normally use. Pay particular attention to frequently touched areas and surfaces, such as bathrooms, grab-rails in corridors and stairwells and door handles • If an area has been heavily contaminated, such as with visible bodily fluids, from a person with coronavirus (COVID-19), use protection for the eyes, mouth and nose, as well as wearing gloves and an apron • Wash hands regularly with soap and water for 20 seconds, and after removing gloves, aprons and other protection used while cleaning
	Using masks • Supporting correct use Repurposing • Medical masks • Alternative materials	Recommendations for face-mask use among the general public in community settings were inconsistent in a comparison of recommendations from different jurisdictions (multi-country comparison of guidelines) **Abstract** Since the outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that caused coronavirus disease 2019 (COVID-19), the use of face masks has become ubiquitous in China and other Asian countries such as South Korea and Japan. Some provinces and municipalities in China have enforced compulsory face mask policies in public areas; however, China's national guideline has adopted a risk-based approach in offering recommendations for using face masks among health-care workers and the general public. We compared face mask use recommendations by different health authorities (panel). Despite the consistency in the recommendation that symptomatic individuals and those in health-care settings should use face masks, discrepancies were observed in the general public and community settings. For example, the US Surgeon General advised against buying masks for use by healthy people. One important reason to discourage widespread use of face masks is to preserve limited supplies for professional use in health-care settings. Universal face mask use in the community has also been discouraged with the argument that face masks provide no effective protection against coronavirus infection.

Appendix 3: Primary studies identified during searches but omitted from the profile given many relevant reviews and guidelines

Relevance to question	Title and link to document
Producing	Custom-made 3D-printed face masks in case of pandemic crisis situations with a lack of commercially available FFP2/3 masks COVID-19: Emerging protective measures. Reusable and recyclable graphene masks with outstanding superhydrophobic and photothermal performances Use of free CAD design software for 3D printing individualized face masks based on face scans
Allocating	Challenges to the system of reserve medical supplies for public health emergencies: reflections on the outbreak of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) epidemic in China. Community pharmacists in Taiwan at the frontline against the novel coronavirus pandemic: Gatekeepers for the rationing of personal protective equipment Facemask shortage and the novel coronavirus disease (COVID-19) outbreak: Reflections on public health measures. Face mask use in the general population and optimal resource allocation during the COVID-19 pandemic Mask crisis during the COVID-19 outbreak. Where to buy face masks? Survey of applications using Taiwan's open data in the time of COVID-19
Using	Alternative qualitative fit testing method for N95 equivalent respirators in the setting of resource scarcity at the George Washington University Face mask use in the general population and optimal resource allocation during the COVID-19 pandemic Hand hygiene, mask-wearing behaviors and its associated factors during the COVID-19 epidemic: A cross-sectional study among primary school students in Wuhan, China. Headaches associated with personal protective equipment: A cross-sectional study among frontline healthcare workers during COVID-19 Impact assessment of non-pharmaceutical interventions against COVID-19 and influenza in Hong Kong: An observational study

Relevance to question	Title and link to document
	Impact of population mask wearing on Covid-19 post lockdown Mathematical assessment of the impact of non-pharmaceutical interventions on curtailing the 2019 novel Coronavirus Rational use of face masks in the COVID-19 pandemic Respirators and surgical facemasks for COVID-19: implications for MRI The role of community-wide wearing of face mask for control of coronavirus disease 2019 (COVID-19) epidemic due to SARS-CoV-2. To mask or not to mask: Modeling the potential for face mask use by the general public to curtail the COVID-19 pandemic Universal masking in hospitals in the COVID-19 era Widespread use of face masks in public may slow the spread of SARS CoV-2: An ecological study
Conserving	No relevant single studies identified
Reusing	A reusable mask for coronavirus disease 2019 (COVID-19) A scalable method of applying heat and humidity for decontamination of N95 respirators during the COVID-19 crisis Assessment of N95 respirator decontamination and re-use for SARS-CoV-2 Concise communication: COVID-19 and the N95 respirator shortage – Closing the gap Decontamination of face masks with steam for mask reuse in fighting the pandemic COVID-19: experimental supports Effect of various decontamination procedures on disposable N95 mask integrity and SARS-CoV-2 infectivity Is the fit of N95 facial masks affected by disinfection? A study of heat and UV disinfection methods using the OSHA protocol fit test. It's not the heat, it's the humidity: Effectiveness of a rice cooker-steamer for decontamination of cloth and surgical face masks and N95 respirators N95 mask decontamination using standard hospital sterilization technologies

Relevance to question	Title and link to document
	Reuse of N95 masks Sterilization of disposable face masks by means of standardized dry and steam sterilization processes; an alternative in the fight against mask shortages due to COVID-19.
Repurposing	Aerosol filtration efficiency of common fabrics used in respiratory cloth masks Assessment of fabric masks as alternatives to standard surgical masks in terms of particle filtration efficiency Informing homemade emergency facemask design: The ability of common fabrics to filter ultrafine particles Modification to PPE with 3D printing during the COVID-19 pandemic at Duke University Medical Center: A novel technique Safety testing improvised COVID-19 personal protective equipment based on a modified full-face snorkel mask Textile masks and surface covers: A 'universal droplet reduction model' against respiratory pandemics Use of a modified ventilation mask to avoid aerosolizing spread of droplets for short endoscopic procedures during coronavirus COVID-19 outbreak

Appendix 4: Chinese government guidelines on the classification of risk, which can be used in supporting the appropriate use of masks

Classification	Risk level	Populations and settings
I	High risk	Fever clinics in epidemic areas
		Medical workers in isolation wards
		Medical workers conducting high-risk activities (e.g., intubations and incisions)
		Service personnel in quarantine area (e.g., cleaners and non-medical workers dealing with cadavers)
		Medical workers conducting epidemiological investigations on confirmed and suspected cases
II	Relatively high risk	Medical workers providing emergency services
		Medical workers conducting epidemiological investigation on people having close contact with confirmed cases
		Medical workers testing epidemic related samples
III	Medium risk	Medical workers working at general outpatient departments or wards
		Non-medical workers working at densely populated places
		Non-medical workers engaged in epidemic-related administration (e.g., police officers, security guards, couriers)
		Citizens under home quarantine and those who live with them
IV	Relatively low risk	Citizens in such densely populated area
		Citizens working in relatively crowded indoor environments
		Citizens visiting medical institutions
		Children and students engaged in collective learning or activities in nurseries, kindergartens or schools
V	Low risk	Citizens engaged in activities at home or living far from others
		Citizens engaged in outdoor activities
		Citizens in well-ventilated indoor environments