

## **EVIDENCE SYNTHESIS BRIEFING NOTE**

**TOPIC:** APPROACHES TO USING MASKS DURING SUPPLY SHORTAGES TO MANAGE COVID-19 IN ONTARIO

*Information finalized as of April 30, 2020; updated on May 19, 2020 with Section B.<sup>a</sup>*

**Purpose:** During the ongoing COVID-19 pandemic, many hospitals and healthcare workers are facing inadequate supplies of masks. In response, strategies to produce, allocate, comply, conserve, reuse, and repurpose different types of masks are being explored in healthcare and non-healthcare settings. This note provides a summary of the existing research evidence and jurisdictional experience on these strategies.

### **Key Findings:**

- Strategies to optimize the use of masks in healthcare settings during supply shortages include:
  - **Produce:** Some jurisdictions have redeployed capacity towards producing masks and fast-tracking regulatory processes, but limited efforts were found to support innovation in developing new technological solutions.
  - **Allocate:** Jurisdictions have particularly focused on establishing guidance on prioritizing the allocation of masks for health care workers, and using centralized processes for storage, management, and distribution of masks.
  - **Use/Comply:** Research and jurisdictions have particularly focused on ensuring correct use and re-use of medical and non-medical masks in different settings and by different populations.
  - **Conserve:** Research and jurisdictions suggest using the same N95 respirator without removing it during repeated close contact or using a N95 respirator beyond its recommended shelf-life, as long as it retains its fit and function.
  - **Reuse:** Research and jurisdictions have suggested using the same N95 respirator multiple times, after decontamination in between uses, as long as it retains its fit and function. Many reprocessing methods exist, but ultraviolet germicidal irradiation and hydrogen peroxide vaporization are the most promising. Other innovations are being considered by Health Canada.
  - **Repurpose:** Health Canada has recommended repurposing equivalent models to N95 respirators if they meet certain specifications. There is insufficient evidence to determine efficacy differences between surgical masks and N95 respirators for protection against COVID-19. Some jurisdictions have guidance on when to use homemade face masks.
- In non-healthcare settings, medical and/or non-medical masks are recommended to be worn by those working in densely populated areas or in close proximity to others (e.g., cashiers, police, staff at points of entry such as public transit hubs and airports).

**Analysis for Ontario:** In Ontario, there are directives or supports related to producing, allocating, using, reusing, and repurposing different types of masks during COVID-19. These recommendations generally align with those provided in the scientific evidence and international/Canadian jurisdictions.

<sup>a</sup> This briefing note is a living document and includes recommendations supported by current available evidence. It is not intended to be an exhaustive analysis, and other relevant findings may have been reported since completion.

## A. Supporting Evidence for Use of Masks in Health Care Settings<sup>b</sup>

Based on research evidence and jurisdictional scans, where available, strategies for supporting the use of masks under supply shortage conditions to prevent COVID-19 transmission can be related to one or more of the following:

1. **Production:** Refers to home-based production, rapid technological innovations, and fast-tracking regulatory processes.
2. **Allocation:** Refers to efficient allocation and stocking practices.
3. **Use/Compliance:** Refers to supports and monitoring for correct use.
4. **Conservation:** Refers to use beyond the recommended duration or shelf-life.
5. **Reuse:** Refers to the “donning” (putting on) and “doffing” (taking off) by the same person without decontaminating, decontaminating and reusing by the same person, and decontaminating and reusing by others.
6. **Repurpose:** Refers to medical masks and alternative materials.

### 1. Production

<i>Scientific Evidence</i>	<ul style="list-style-type: none"> <li>• There is limited evidence on effectiveness of 3D-printed N95 respirators. Many health authorities emphasized that they may not provide the same fluid barrier and air filtration protection as conventionally produced N95 respirators.<sup>1</sup></li> </ul>
<i>International Scan</i>	<ul style="list-style-type: none"> <li>• South Korea, the UK, and the US have redeployed capacity towards producing masks, such as partnering with businesses, issuing regulatory requirements, or allowing unapproved products to reach patients in need when there are no approved or available alternatives (see <a href="#">Table 2</a> in the Appendix).<sup>2</sup></li> <li>• New Zealand has issued guidance on how to safely make home-made masks (see <a href="#">Table 2</a> in the Appendix).<sup>3</sup></li> </ul>
<i>Canadian Scan</i>	<ul style="list-style-type: none"> <li>• Health Canada has expedited their approval process for product reviews and established additional licenses related to essential products.<sup>4</sup></li> <li>• The Government of Canada has established <a href="http://www.buyandsell.gc.ca">www.buyandsell.gc.ca</a>, which aims to match businesses that can supply needed products and services with specific gaps.<sup>5</sup> <ul style="list-style-type: none"> <li>○ Alberta and New Brunswick have also launched programs with individuals, organizations, and businesses to develop or donate masks (see <a href="#">Table 1</a> in the Appendix).<sup>6</sup></li> </ul> </li> <li>• British Columbia, Nunavut, and Prince Edward Island have issued recommendations on the production of home-made masks for citizens who choose to wear them (see <a href="#">Table 1</a> in the Appendix).<sup>7</sup></li> </ul>
<i>Ontario Scan</i>	<ul style="list-style-type: none"> <li>• The Government of Ontario launched the website <a href="#">Ontario Together</a> to help businesses and their employees work with the province to redeploy capacity towards the production of essential equipment.<sup>8</sup></li> <li>• To resolve procurement issues in the long-term care sector, the province established the 24/7 Long-Term Care COVID-19 Response Team.<sup>9</sup></li> </ul>

### 2. Allocation

<i>Scientific Evidence</i>	<ul style="list-style-type: none"> <li>• There is lack of evidence on the effectiveness of face masks in limiting the spread of COVID-19 among those who are not medically diagnosed with the virus.<sup>10</sup></li> </ul>
<i>International Scan</i>	<ul style="list-style-type: none"> <li>• Prioritization guidance is being adopted in China, New Zealand, the UK, and the US (see <a href="#">Table 2</a> in Appendix).<sup>11</sup></li> </ul>

<sup>b</sup> The abstracts for highly relevant documents included in this section are profiled in [Table 3](#) in the Appendix.

	<ul style="list-style-type: none"> <li>Allocation strategies for the supply and management of masks have been developed in France, South Korea, and the US. South Korean companies have created apps to track the use and availability of masks (see <a href="#">Table 2</a> in the Appendix).<sup>12</sup></li> </ul>
<i>Canadian Scan</i>	<ul style="list-style-type: none"> <li>Prioritization guidance is being adopted in most provinces across Canada.<sup>13</sup></li> <li>British Columbia, Manitoba, Quebec, Alberta, Nova Scotia, and Prince Edward Island have established response teams, PPE allocation frameworks, and/or centralized PPE request processes to coordinate goods and services distribution of masks (see <a href="#">Table 1</a> in the Appendix).<sup>14</sup></li> </ul>
<i>Ontario Scan</i>	<ul style="list-style-type: none"> <li>Ontario Health has developed an <a href="#">ethics prioritization guidance</a> on the use of personal protective equipment under critical shortages.<sup>15</sup></li> </ul>

### 3. Use/Compliance

<i>Scientific Evidence</i>	<ul style="list-style-type: none"> <li>Several factors influence health care workers' ability to follow infection prevention and control guidelines for respiratory infectious diseases, including the guideline itself and how it is communicated, support from managers, workplace culture, training, physical space, access to and trust in PPE, and a desire to deliver good patient care.<sup>16,17</sup></li> <li>Long and frequently changing guidelines make it difficult for staff to adhere to best practices.<sup>18</sup></li> <li>Respirator masks can be considered for high-risk aerosol-generating procedures in combination with other PPE measures when in short supply.<sup>19,20</sup></li> </ul>
<i>International Scan</i>	<ul style="list-style-type: none"> <li>Guidelines on mask use have been developed in China, France, Germany, New Zealand, South Korea, the UK, and the US (see <a href="#">Table 2</a> in the Appendix).<sup>21</sup></li> </ul>
<i>Canadian Scan</i>	<ul style="list-style-type: none"> <li>Almost all provinces have recommended that 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.<sup>22</sup></li> </ul>
<i>Ontario Scan</i>	<ul style="list-style-type: none"> <li>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.<sup>23</sup></li> <li>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.<sup>24</sup></li> <li>Public Health Ontario has issued additional <a href="#">guidance</a> related to universal mask use in health care settings and retirement homes.<sup>25</sup></li> </ul>

### 4. Conservation

<i>Scientific Evidence</i>	<ul style="list-style-type: none"> <li>Extended use or use beyond shelf-life of N95 respirators is suitable as long as they retain their fit and function.<sup>26,27,28</sup></li> </ul>
<i>International Scan</i>	<ul style="list-style-type: none"> <li>The UK has recommended sessional use (e.g., a ward round, taking observations of several patients in a cohort bay or ward) of N95 respirators (see <a href="#">Table 2</a> in the Appendix).</li> </ul>
<i>Canadian Scan</i>	<ul style="list-style-type: none"> <li>Health Canada suggests that while N95 respirators 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. No specific timeframe has been established.<sup>29</sup></li> <li>Alberta and Quebec have issued guidance on the use of expired respirators, and Saskatchewan has issued recommendations for extended use of masks in different health sectors (see <a href="#">Table 1</a> in the Appendix).<sup>30</sup></li> </ul>

	<ul style="list-style-type: none"> <li>In Nova Scotia, masks need to be signed out by a health authority unit manager or designate (see <a href="#">Table 1</a> in the Appendix).<sup>31</sup></li> </ul>
<i>Ontario Scan</i>	<ul style="list-style-type: none"> <li>Ontario Health published recommendations for conserving the supply of masks during COVID-19.<sup>32</sup></li> </ul>

## 5. Reuse

<i>Scientific Evidence</i>	<ul style="list-style-type: none"> <li>Reuse of decontaminated N95 respirator masks is not encouraged, particularly if other methods of optimization are available.<sup>33,34,35,36</sup> Extended use of N95 respirators is recommended to be prioritized over decontamination and reuse.<sup>37,38,39,40</sup></li> <li>The decontamination and reuse of physically-intact N95 respirators is considered to be appropriate when there are shortages, depending on the type of respirator model and reprocessing method.<sup>41,42,43,44,45</sup></li> <li>Promising methods for decontaminating N95 respirators without impacting efficacy and safety include ultraviolet germicidal irradiation (UVGI)<sup>46,47,48,49,50,51</sup> and a single-cycle of hydrogen peroxide vapour (HPV).<sup>52,53,54,55,56,57</sup> Though more information is required, some research suggests microwave irradiation and some heat-based decontamination methods may be effective and safe options.<sup>58,59,60,61</sup></li> <li>Sodium hypochlorite, ethanol, isopropyl alcohol, ethylene oxide, and autoclaving are not recommended for decontaminating N95 respirators due to efficacy and safety concerns.<sup>62,63,64</sup></li> </ul>
<i>International Scan</i>	<ul style="list-style-type: none"> <li>South Korea has issued guidance on how to reuse masks for the general public, and the UK and US have issued guidance on the reuse of masks in health care settings (see <a href="#">Table 2</a> in the Appendix).<sup>65</sup></li> </ul>
<i>Canadian Scan</i>	<ul style="list-style-type: none"> <li>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.<sup>66</sup></li> <li>Products <a href="#">approved</a> by Health Canada under the Interim Order are updated daily.<sup>67</sup></li> <li>The Canadian Agency for Drugs and Technologies in Health (CADTH) highlights technologies that have been suggested for use in the decontamination of N95 respirators.<sup>68</sup></li> <li>Alberta, Saskatchewan, and Manitoba are collecting and reprocessing used N95 models for organizations unable to source new supplies (see <a href="#">Table 1</a> in the Appendix).<sup>69</sup></li> <li>Quebec has guidelines on reusing masks (see <a href="#">Table 1</a> in the Appendix).<sup>70</sup></li> </ul>
<i>Ontario Scan</i>	<ul style="list-style-type: none"> <li>The Chemical Engineering department at the University of Toronto, in collaboration with affiliate hospitals and the national microbiology laboratory, is testing the safety and efficacy of 11 models of N95 respirators (n=220) treated with nine different disinfection protocols. Many hospitals have been working closely with local universities to undertake this research. Preliminary results suggest that some methods may not be compatible with specific brands/types of N95 respirators produced. Results will be published soon, and the research team will evaluate these tests in clinical settings.<sup>71,72</sup></li> </ul>

## 6. Repurpose

<i>Scientific Evidence</i>	<ul style="list-style-type: none"> <li>There is insufficient evidence to determine the difference in effectiveness between surgical masks and N95 respirators for protection against respiratory viruses, including COVID-19.<sup>73,74,75</sup></li> </ul>
<i>International Scan</i>	<ul style="list-style-type: none"> <li>Italy, New Zealand, and the US have issued guidance on when to use homemade face masks (see <a href="#">Table 2</a> in the Appendix).</li> </ul>

<i>Canadian Scan</i>	<ul style="list-style-type: none"> <li>Health Canada has recommended that commercial N95 respirators may be used during the COVID-19 outbreak if alternatives are not available. Other models similar to the approved N95 respirator may be used if they meet <a href="#">related specifications</a>, such as the KN95 respirators.<sup>76</sup></li> </ul>
<i>Ontario Scan</i>	<ul style="list-style-type: none"> <li>Ontario Health published recommendations on repurposing masks during COVID-19.<sup>77</sup></li> </ul>

## B. Supporting Evidence for Use of Masks in Non-Healthcare Settings

<i>Scientific Evidence</i>	<ul style="list-style-type: none"> <li>There is insufficient evidence to recommend universal wearing of non-medical face masks as a protective measure against COVID-19, but it may be useful for high-risk individuals in transient situations.<sup>78,79</sup></li> <li>Medical masks are recommended to be worn by police, military, professions that have close proximity to other people (e.g., cashiers), staff working in points of entry (e.g., cleaners, screeners, and interviewers in airports or ports), and workers developing respiratory symptoms.<sup>80</sup></li> </ul>
<i>International Scan</i>	<ul style="list-style-type: none"> <li>For non-medical masks, China, France, Germany, Italy, South Korea, U.K., and U.S. recommend some degree of face covering in limited circumstances, including when using public transit or in smaller retail stores where maintaining social distance may be difficult.<sup>81</sup> <ul style="list-style-type: none"> <li>China and South Korea are the only two countries among the jurisdictions examined that have recommended wearing a mask more broadly in public.<sup>82</sup></li> <li>A few jurisdictions (France, Germany, and Italy) were found to have changed their recommendations since mid-March, however it remains unclear the extent to which these decisions were informed by changing evidence.<sup>83</sup></li> </ul> </li> <li>For medical masks, the commonality in guidance from China, New Zealand, and South Korea appears to be to provide medical masks to essential workers who are working in densely populated workplaces (e.g., transit hubs) or are in frequently contact with many people (e.g., policing).<sup>84</sup></li> </ul>
<i>Canadian Scan</i>	<ul style="list-style-type: none"> <li>Almost all provinces have recommended that 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.<sup>85</sup></li> <li>In Saskatchewan, as part of the <a href="#">Re-Open Saskatchewan plan</a>, as personal services (e.g., hairstylists, registered massage therapists, acupuncturists) re-open, clients will be screened and asked to wear gloves and face masks.<sup>86</sup></li> </ul>
<i>Ontario Scan</i>	<ul style="list-style-type: none"> <li>Provincial recommendations on mask use for workers in non-healthcare settings are to consider using medical or non-medical masks to provide some source control in areas where physical distancing may be challenging or not possible. However, good hand hygiene practices are essential to avoid self-inoculation from face touching. <ul style="list-style-type: none"> <li>In the current context of PPE shortages associated with COVID-19, medical masks should be conserved for use in healthcare settings. Non-medical masks (e.g., cloth masks) are recommended as the preferred choice in most situations where masking is for source control.</li> <li>A COVID-19 exposure risk assessment for workers may aid employers considering a policy on masking for source control (e.g., see considerations recommended by <a href="#">US Occupational Safety and Health Administration</a> and <a href="#">WHO</a>).<sup>87</sup></li> </ul> </li> </ul>

## **Methods**

The COVID-19 Evidence Synthesis Network is comprised of groups specializing in evidence synthesis and knowledge translation. The group has committed to provide their expertise to provide high-quality, relevant, and timely synthesized research evidence about COVID-19 to inform decision makers as the pandemic continues. The following members of the Network provided evidence synthesis products that were used to develop this Evidence-To-Policy Briefing Note:

- Canadian Agency for Drugs and Technologies in Health. April 27, 2020. [Optimization of N95 Respirator Masks during Supply Shortages – Round Up \(CADTH Horizon Scan\)](#). Ottawa.
- Ontario Agency for Health Protection and Promotion (Public Health Ontario). April 4, 2020. [COVID-19 – What We Know So Far About...Reuse of Personal Protective Equipment](#).
- Ontario Health (Quality). April 11, 2020. [Recommendations on Optimizing the Supply of Personal Protective Equipment During the COVID-19 Pandemic](#).
- Ontario Hospitals Association. May 1, 2020. PPE Decontamination Meeting Notes. Personal Communication.
- Trillium Health Partners and Institute for Better Health. April 6, 2020. IBH Evidence Summary on N95 Reprocessing – Draft. Personal Communication.
- Waddell K, Gauvin FP, Wilson MG, Moat KA, Mansilla C, Wang Q, Lavis JN. 29 April 2020. [COVID-19 rapid evidence profile #5: What is known about the use of medical masks by essential non-medical workers to prevent community transmission of COVID-19?](#) Hamilton: McMaster Health Forum.
- Waddell K, Wilson MG, Gauvin FP, Mansilla, C, Moat KA, Wang Q, Lavis JN. 30 April 2020. [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.
- Wilson MG, Gauvin FP, Moat KA, Waddell K, Mansilla C, Wang Q, Lavis JN. 29 April 2020. [COVID-19 rapid evidence profile #4: What are the most effective non-medical masks for preventing community transmission of COVID-19, and should they be required for all of society?](#) Hamilton: McMaster Health Forum.

**APPENDIX**

**Table 1: Canadian Strategies Supporting the Safe Use of Masks Under Shortage Conditions<sup>88</sup>**

Province/ territory	Key features of implemented strategies
<b>Pan-Canadian</b>	<ul style="list-style-type: none"> <li>• <b>Producing:</b> Health Canada has expedited their approval process for product reviews as well as establishing additional licenses related to essential products               <ul style="list-style-type: none"> <li>○ Government of Canada has established <a href="http://www.buyandsell.gc.ca">www.buyandsell.gc.ca</a>, which aims to match businesses that can supply needed products and services with specific gaps</li> </ul> </li> <li>• <b>Conserving:</b> Health Canada has suggested that while N95 and surgical masks past their designated shelf life are 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               <ul style="list-style-type: none"> <li>○ No specific timeframe as been established</li> </ul> </li> <li>• <b>Re-using:</b> 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</li> <li>• <b>Re-purposing:</b> Health Canada has recommended that commercial N95 respirators may be used during the COVID-19 outbreak if alternatives are not available               <ul style="list-style-type: none"> <li>○ Other models similar to the approved N95 may be used if they meet <a href="#">related specifications</a>, such as the KN95 respirators</li> </ul> </li> </ul>
<b>B.C.</b>	<ul style="list-style-type: none"> <li>• <b>Producing:</b> 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</li> <li>• <b>Using:</b> The BC CDC has states that medical masks and N95 respirators should be reserved for healthcare workers and those who are sick               <ul style="list-style-type: none"> <li>○ 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</li> <li>○ The BC CDC has also developed a number of visuals that depict correct ways for workers to <a href="#">put on</a> (don) and <a href="#">take off</a> (doffing) personal protective equipment (PPE)</li> </ul> </li> <li>• <b>Allocating:</b> 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               <ul style="list-style-type: none"> <li>○ Government has established an emergency prioritization in a pandemic PPE allocation <a href="#">framework</a>, which provides guidance for the conservation, re-use and priority allocation of PPE</li> </ul> </li> </ul>
<b>Alberta</b>	<ul style="list-style-type: none"> <li>• <b>Producing:</b> The Government of Alberta announced the '<a href="#">Bits and Pieces Program</a>' which works with individuals, private companies and non-profit organizations to develop needed products and services, including personal protective equipment that meet provincial standards</li> <li>• <b>Allocating:</b> In enacting the Emergency Management Act the Emergency Management Agency was created to coordinated emergency responses, specifically to manage the supply chain, including procurement and distribution of PPE               <ul style="list-style-type: none"> <li>○ 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, social service and civil society groups helping to ensure efficient procurement and allocation</li> </ul> </li> <li>• <b>Using:</b> 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               <ul style="list-style-type: none"> <li>○ 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</li> </ul> </li> <li>• <b>Conserving:</b> Alberta Occupational Health and Safety extended the expiry period of existing fit tests on the current respirator model to December 31, 2020</li> <li>• <b>Re-using:</b> 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</li> </ul>

Province/ territory	Key features of implemented strategies
Saskatchewan	<ul style="list-style-type: none"> <li>• <b>Using:</b> 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.</li> <li>• <b>Conserving:</b> Saskatchewan Health Authority has issued <a href="#">recommendations</a> for extended use of facemasks and eye protection for a number of different sectors including acute care, continuing care, testing assessment sites, home care, and primary care</li> <li>• <b>Re-using:</b> 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 used for the preparation of or procedures that involve cytotoxic medications</li> </ul>
Manitoba	<ul style="list-style-type: none"> <li>• <b>Allocating:</b> 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</li> <li>• <b>Using:</b> Shared Health Manitoba has defined a <a href="#">provincial requirements</a> for PPE in healthcare settings</li> <li>• <b>Re-using:</b> Shared Health Manitoba has said that lightly used N95 respirators are eligible for sterilization</li> </ul>
Ontario	<ul style="list-style-type: none"> <li>• <b>Producing:</b> 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 <ul style="list-style-type: none"> <li>○ To resolve procurement issues in the long-term care sector, the province established the 24/7 Long Term Care COVID-19 Response Team</li> </ul> </li> <li>• <b>Using:</b> 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 <ul style="list-style-type: none"> <li>○ Provincial recommendations for all citizens are to consider using a face covering to reducing the risk of transmission of COVID-19 in areas where physician distancing may be challenging or not possible, however while ensuring to properly use, clean, and dispose of face coverings</li> <li>○ Public Health Ontario has issued additional guidance related to mask use in healthcare settings and retirement homes</li> </ul> </li> </ul>
Quebec	<ul style="list-style-type: none"> <li>• <b>Allocating:</b> The Ministry of Health and Social Services is planning a <a href="#">strategy for supplying drugs, equipment and supplies required during the COVID-19 pandemic</a>.</li> <li>• <b>Using:</b> The Institut national de santé publique du Québec produced several guidelines to support the appropriate use of masks and respirators, including: <ul style="list-style-type: none"> <li>○ <a href="#">Exceptional measures for personal protective equipment (including masks) during a pandemic</a></li> <li>○ <a href="#">Guidelines on wearing a procedure mask in healthcare settings during sustained community transmission</a></li> </ul> </li> <li>• <b>Conserving and re-using:</b> The Institut national de santé publique du Québec produced several guidelines to support the storing and re-use of masks and respirators, including <ul style="list-style-type: none"> <li>○ <a href="#">Interim guidelines: collection, disinfection and storage process for single-use N95 respirators</a></li> <li>○ <a href="#">Guidelines on the use of expired N95 respirators</a></li> </ul> </li> <li>• <b>Re-purposing:</b> The Institut national de santé publique du Québec released <a href="#">guidelines on the use of face masks (e.g., cloth mask) for all citizens</a></li> </ul>
New Brunswick	<ul style="list-style-type: none"> <li>• <b>Producing:</b> Service New Brunswick has opened up a process for established businesses to donate personal protective equipment to help medical workers</li> </ul>
Nova Scotia	<ul style="list-style-type: none"> <li>• <b>Allocating:</b> 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</li> <li>• <b>Using:</b> Nova Scotia Health Authority has issued <a href="#">recommendations</a> by sector and setting for PPE and mask wearing for medical workers as well as <a href="#">guides to putting on and off</a> PPE safely</li> <li>• <b>Conserving:</b> 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,</li> </ul>
Prince Edward Island	<ul style="list-style-type: none"> <li>• <b>Producing:</b> Government of PEI have provided directions on the fit and material for homemade face coverings should citizens choose to wear them, these including choosing materials such as cotton or linen and ensuring it is made of at least two layers</li> <li>• <b>Allocating:</b> COVID-19 Joint Response Team has been put in charge of monitoring and adjusting supplies to ensure PPE is available across the province</li> <li>• <b>Using:</b> Guidelines and visual posters have been created on the use of PPE for medical workers</li> </ul>
Newfoundland and Labrador	<ul style="list-style-type: none"> <li>• <b>Using:</b> Government of Newfoundland and Labrador have established guidelines for how to safely put on and remove personal protective equipment</li> </ul>



Province/ territory	Key features of implemented strategies
<b>Yukon</b>	<ul style="list-style-type: none"> <li>• <b>Using:</b> Government of Yukon has established recommendations for PPE for different sectors and settings including outpatient facilities</li> <li>• The government has also included guidelines for putting on and taking off PPE safely</li> </ul>
<b>Northwest Territories</b>	<ul style="list-style-type: none"> <li>• <b>Using:</b> Office of the Chief Public Health Officer is recommending that residents use re-usable or disposable face coverings when in public places</li> </ul>
<b>Nunavut</b>	<ul style="list-style-type: none"> <li>• <b>Producing:</b> Government of Nunavut has created <a href="#">instructions</a> on how to create a non-medical mask at home</li> <li>• <b>Using:</b> Government of Nunavut has established requirements for face covering for air travellers coming in and out of the territory</li> </ul>

**Table 2: International Strategies Supporting the Safe Use of Masks Under Shortage Conditions<sup>89,c</sup>**

Country	Key features of implemented strategies
<b>China</b>	<p><b>Using/Complying</b></p> <ul style="list-style-type: none"> <li>• China's Joint Prevention and Control Mechanism of the State Council released <a href="#">guidelines for selection and use of masks to prevent COVID-19 in different populations</a></li> <li>• As of 4 February 2020, people have been divided into risk levels               <ul style="list-style-type: none"> <li>○ 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.</li> <li>○ 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</li> <li>○ 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 classroom and construction site housing.</li> <li>○ Those working in high-risk areas, where it is not possible to keep two meters of distance are required to wear a mask that conforms to KN94/N95 and above without an exhalation valve.</li> </ul> </li> </ul>
<b>France</b>	<p><b>Allocating</b></p> <ul style="list-style-type: none"> <li>• The government elaborated a <a href="#">strategy for the supply and management of protective masks</a> in the country.</li> </ul> <p><b>Using/Complying</b></p> <ul style="list-style-type: none"> <li>• The government released guidelines for medical workers about what mask to wear in <a href="#">healthcare settings</a> and <a href="#">non-healthcare settings</a>.</li> <li>• 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.</li> </ul>
<b>Germany</b>	<p><b>Using/Complying</b></p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• 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</li> </ul>
<b>Italy</b>	<p><b>Re-purposing</b></p> <ul style="list-style-type: none"> <li>• 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.</li> </ul>
<b>New Zealand</b>	<p><b>Allocating</b></p> <ul style="list-style-type: none"> <li>• The Ministry of Health released <a href="#">guidance for prioritizing personal protective equipment in healthcare settings</a>.</li> </ul> <p><b>Using/Complying and re-purposing</b></p> <ul style="list-style-type: none"> <li>• The Ministry of Health released several guidances on the optimal use of personal protective equipment in <a href="#">healthcare settings</a> and <a href="#">non-healthcare workplaces</a>, as well as among the <a href="#">general population</a>.</li> <li>• As of 25 April 2020, the New Zealand government does not support the widespread use of face masks by healthy people in the community.</li> <li>• 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 along, which is accompanied by an outline of the risks of using masks poorly.</li> <li>• 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.</li> </ul>
<b>South Korea</b>	<b>Producing</b>

<sup>c</sup> The countries highlighted in the table were selected because they have (or had) a high prevalence of COVID-19 and/or have gradually reopened.

	<ul style="list-style-type: none"> <li>Government encouraged companies with capabilities to ramp up their production of masks for distribution to pharmacies in order to supply the general population</li> </ul> <p><b>Allocating</b></p> <ul style="list-style-type: none"> <li>Government banned the export of masks to prioritize domestic demand, and first prioritized ensuring facemasks were allocated first to physicians and medical staff, and after recommending all members of the public wear facemasks, used domestically produced masks, distributed to pharmacies to ration their sale among the general public while releasing guidelines on their re-use.</li> <li>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</li> </ul> <p><b>Using/Complying</b></p> <ul style="list-style-type: none"> <li>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</li> <li>Medical masks similar to a KF94 or N95 model are recommended for anyone in public or dense locations, including workers.</li> </ul> <p><b>Re-using</b></p> <ul style="list-style-type: none"> <li>Government published recommendations for how to re-use masks for the general public after rationing their sale in pharmacies</li> </ul>
<p><b>United Kingdom</b></p>	<p><b>Producing</b></p> <ul style="list-style-type: none"> <li>The Medicines and Healthcare Products Regulatory Agency has put in place rules that masks must be approved and CE marked before sale in the UK, 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.</li> <li>There are possible exemptions for some high-volume manufacturers of PPE for the regulatory process if they are meeting standards</li> </ul> <p><b>Allocating</b></p> <ul style="list-style-type: none"> <li>Public Health England has recommended that all health and 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</li> </ul> <p><b>Using/Complying</b></p> <ul style="list-style-type: none"> <li>Public Health England has recommended:             <ul style="list-style-type: none"> <li>all health and social care staff be trained on donning and doffing PPE, and practice hand hygiene after removing any element of PPE;</li> <li>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;</li> <li>the rational use of all respirators (FFP3) and surgical masks, which it provides extensive guidance based on best practices about; and</li> <li>that all patients use of facemasks, unless their care can be compromised as a result of doing so.</li> </ul> </li> </ul> <p><b>Conserving</b></p> <ul style="list-style-type: none"> <li>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</li> </ul> <p><b>Re-using</b></p> <ul style="list-style-type: none"> <li>Public Health England as recommended re-use 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.</li> </ul>
<p><b>United States</b></p>	<p><b>Producing</b></p> <ul style="list-style-type: none"> <li>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 <a href="#">Emergency Use Authorization</a> 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.</li> </ul> <p><b>Allocating</b></p> <ul style="list-style-type: none"> <li>The U.S Centers for Disease Control and Prevention (CDC) released its <a href="#">Strategies for Optimizing the Supply of N95 Respirators</a></li> </ul> <p><b>Using/Complying</b></p>

	<ul style="list-style-type: none"><li>• The U.S CDC released <a href="#">different guidance is required for the appropriate use in communities, schools, workplaces, and events</a></li><li>• The U.S. Department of Labor and Department of Health &amp; Human Services also released guidance indicating that <a href="#">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</a></li></ul> <p><b>Re-using</b></p> <ul style="list-style-type: none"><li>• The U.S CDC released <a href="#">recommendations for extended use and limited reuse of N95 filtering facepiece respirators in healthcare settings</a></li></ul> <p><b>Re-purposing</b></p> <ul style="list-style-type: none"><li>• The U.S CDC recommended <a href="#">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</a></li></ul>
--	--

**Table 3: Abstracts for Highly Relevant Documents<sup>90</sup>**

Type of document	Relevant to question	Abstract and link to full text
Full systematic review	Allocating masks <ul style="list-style-type: none"> <li>Efficient allocation</li> </ul>	<p><a href="#">Lack of evidence about use of masks by those not diagnosed with COVID-19 to limit spread</a></p> <p><b>Abstract</b> 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.</p>
	Re-using <ul style="list-style-type: none"> <li>Decontaminating and re-using by the same person or by others</li> </ul>	<p><a href="#">Vaporized hydrogen peroxide successfully decontaminates N95 facepiece respirators, whereas alcohol or sodium hypochlorite are not recommended</a></p> <p><b>Abstract</b> 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 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.</p>
	Using masks <ul style="list-style-type: none"> <li>Supporting correct use</li> </ul>	<p><a href="#">Long and frequently changing guidelines make it difficult for staff to adhere to best practices in infection control and prevention</a></p>

Type of document	Relevant to question	Abstract and link to full text
		<p><b>Abstract</b>            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 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</p>

Type of document	Relevant to question	Abstract and link to full text
		<p>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 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.</p>
	<p>Using masks</p> <ul style="list-style-type: none"> <li>Supporting correct use</li> </ul>	<p>1.1. <a href="#">Long and frequently changing guidelines make it difficult for staff to adhere to best practices in infection control and prevention</a></p> <p><b>Abstract</b> 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. Selection 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 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</p>

Type of document	Relevant to question	Abstract and link to full text
		<p>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 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.</p>
	<p>Conserving masks</p> <ul style="list-style-type: none"> <li>• Use beyond the recommended duration</li> <li>• Use beyond recommended shelf life</li> </ul> <p>Re-using masks</p> <ul style="list-style-type: none"> <li>• Decontaminating and re-using by the same person</li> <li>• Decontaminating and re-using by others</li> </ul>	<p><a href="#">Using standard PPE and providing training for donning and doffing masks reduces contamination from highly infectious diseases</a></p> <p><b>Abstract</b></p> <p>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</p>



Type of document	Relevant to question	Abstract and link to full text
		<p>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) 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.</p>
	<p>Using masks</p> <ul style="list-style-type: none"> <li>Supporting correct use</li> </ul>	<p><a href="#">Preservation of N95 respirators for high-risk procedures should be considered when in short supply</a></p> <p><b>Abstract</b> 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 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.</p>

Type of document	Relevant to question	Abstract and link to full text
	Using masks <ul style="list-style-type: none"> <li>Supporting correct use</li> </ul>	<p><a href="#">Standard surgical masks are as effective as N95 for preventing infection of healthcare workers</a></p> <p><b>Key findings</b> 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 mask 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.</p>
	Conserving masks <ul style="list-style-type: none"> <li>Use beyond recommended duration</li> <li>Use beyond recommended shelf life</li> </ul> Re-using masks <ul style="list-style-type: none"> <li>Decontaminating and re-using by the same person</li> <li>Decontaminating and re-using by others</li> </ul>	<p><a href="#">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</a></p> <p><b>Abstract</b> 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.<sup>1</sup> 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 decontamination or 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.</p>
	Re-using masks <ul style="list-style-type: none"> <li>Decontaminating and re-using by the same person</li> <li>Decontaminating and re-using by others</li> </ul>	<p><a href="#">Ultraviolet light germicidal irradiation can restore N95 masks to certification standards of the National Institute for Occupation Safety and Health (U.S.)</a></p> <p><b>Abstract</b> 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 H<sub>2</sub>O (7.97-11.70 mm H<sub>2</sub>O) vs 9.85 mm H<sub>2</sub>O (8.33-11.44 mm H<sub>2</sub>O) for UVGI treatment arms. All UVGI protocols employing a cumulative dose &gt;20,000 J/m<sup>2</sup> resulted in a 2 log reduction in viral load. A &gt;3 log reduction was observed in 7 UVIG arms using a dose &gt;40,000 J/m<sup>2</sup>. Impact of UVIG on fit was evaluated in two studies (16,200; 32,400 J/m<sup>2</sup>) 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/m<sup>2</sup> or greater, and confirm appropriate mask fit following decontamination.</p>
Rapid reviews	Producing masks	<p><a href="#">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</a></p>

Type of document	Relevant to question	Abstract and link to full text
	<ul style="list-style-type: none"> <li>Rapid technological innovations</li> </ul>	<p><b>Key messages</b></p> <p>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:</p> <ul style="list-style-type: none"> <li>There is very limited evidence on effectiveness; only some models/designs have been tested in a clinical setting (see table below)</li> <li>Guidance from national and international health authorities emphasize that 3D-printed N95 respirators may not provide the same fluid barrier and air filtration protection</li> <li>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</li> </ul>
	<p>Using masks</p> <ul style="list-style-type: none"> <li>Supporting correct use</li> </ul>	<p><a href="#">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</a></p> <p><b>Abstract</b></p> <p>The current pandemic of COVID-19 has led 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, I<sup>2</sup> 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<sup>2</sup> 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, I<sup>2</sup> 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.</p>
	<p>Using masks</p> <ul style="list-style-type: none"> <li>Supporting correct use</li> </ul>	<p><a href="#">No evidence that cloth masks in the community setting prevent viral respiratory illness and may present a risk to the wearer</a></p>

Type of document	Relevant to question	Abstract and link to full text
		<p><b>Key findings</b></p> <ul style="list-style-type: none"> <li>• No trials exist which compare cloth masks to medical masks of nil covering in the community setting</li> <li>• 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</li> <li>• These results were assessed for relevance to the community setting</li> <li>• 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</li> <li>• 28 more people per 1000 may develop clinical respiratory infections if they wear a cloth mask compared to a medical mask. This could be 0 fewer to 71 per 1000 more infections.</li> <li>• 22 more people per 1000 may develop laboratory confirmed respiratory infections if they wear a cloth mask compared to a medical mask. This could be 2 fewer to 63 per 1000 more infections.</li> <li>• 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.</li> <li>• Compliance with wearing masks and levels of discomfort are similar in both groups</li> </ul>
	<p>Using masks</p> <ul style="list-style-type: none"> <li>• Supporting correct use</li> </ul>	<p><a href="#"><u>Evidence about effectiveness of facemasks was based mostly on medical-grade masks 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 facemasks for short periods of time (e.g., by vulnerable individuals)</u></a></p> <p><b>Abstract</b></p> <p>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.</p> <p>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.</p> <p>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).</p> <p>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</p>

Type of document	Relevant to question	Abstract and link to full text
		<p>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 COVID19. 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.</p>
	<p>Conserving masks</p> <ul style="list-style-type: none"> <li>Extended use</li> <li>Use beyond shelf life</li> </ul> <p>Re-using masks</p> <ul style="list-style-type: none"> <li>Reusing by the same person without decontaminating</li> <li>Decontaminating and reusing by the same person</li> </ul>	<p><a href="#">Reprocessing using ultraviolet light germicidal irradiation, vaporous hydrogen peroxide, and heat-based decontamination may be effect for decontaminating for the reuse of N95 masks, and extension of shelf life and extended use may also be options</a></p> <p>Bottom Line: Based on the evidence available as of April 17, 2020:</p> <ul style="list-style-type: none"> <li>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.</li> <li>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</li> <li>With the rapidly changing environment, new technologies may be approved for reprocessing. Any method used for reprocessing should incorporate standard protocols.</li> <li>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.</li> <li>Alternative sourcing of N95 respirator masks (e.g., beyond shelf life) and extended use may also be an option.</li> <li>Much of the evidence available is based on the Centers for Disease Control and Prevention (CDC) recommendations2 and ECRI reports.</li> </ul>
	<p>Conserving masks</p> <ul style="list-style-type: none"> <li>Extended use</li> </ul> <p>Re-using masks</p> <ul style="list-style-type: none"> <li>Reusing by the same person without decontaminating</li> <li>Decontaminating and reusing by the same person</li> </ul>	<p><a href="#">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</a></p> <p>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.</p> <p>The available studies support prioritizing N95 extended use over reuse because of the following:</p> <ul style="list-style-type: none"> <li>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).</li> <li>Use of surgical masks or similar disposable covers over N95s during extended use are unlikely to result in significant adverse effects.</li> <li>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.</li> </ul>

Type of document	Relevant to question	Abstract and link to full text
		<ul style="list-style-type: none"> <li>Commonly effective disinfection methods can achieve adequate disinfection, with some filter performance loss.</li> </ul> <p>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.</p>
	<p>Re-using masks</p> <ul style="list-style-type: none"> <li>Reusing by the same person without decontaminating</li> <li>Decontaminating and reusing by the same person</li> <li>Decontaminating and reusing by others</li> </ul>	<p><a href="#">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</a></p> <p><b>Abstract</b> 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.</p>
	<p>Re-purposing masks</p> <ul style="list-style-type: none"> <li>Alternative materials</li> </ul>	<p><a href="#">The use of cloth masks in healthcare settings might increase the rates of infection, and it should be used as last resort</a> (AMSTAR rating 1/9)</p> <p><b>Key messages</b> 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.</p> <p>We examined the recommendations from national and international health authorities and organizations and completed a targeted search of published literature. We found the following:</p> <ul style="list-style-type: none"> <li>Only one randomized trial assessed cloth masks in a health care 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 health care setting</li> </ul>
<p>Guidelines developed using some type of evidence synthesis and/or expert opinion</p>	<p>Allocating masks</p> <ul style="list-style-type: none"> <li>Efficient allocation</li> <li>Stocking practices (including monitoring)</li> </ul>	<p><a href="#">Conventional-, contingency- and crisis-capacity strategies are necessary to optimize the supply of N95 respirators</a> (U.S. CDC)</p> <p>Summary of Updates as of April 2, 2020:</p> <ul style="list-style-type: none"> <li><a href="#">Conventional capacity strategies</a> <ul style="list-style-type: none"> <li>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.</li> </ul> </li> </ul>

Type of document	Relevant to question	Abstract and link to full text
		<ul style="list-style-type: none"> <li>○ 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.</li> <li>● <a href="#">Contingency capacity strategies</a> <ul style="list-style-type: none"> <li>○ Added a section on temporarily suspending annual fit testing following updated guidance from OSHA</li> <li>○ Added more details in the extended use section.</li> </ul> </li> <li>● <a href="#">Crisis capacity strategies</a> <ul style="list-style-type: none"> <li>○ Added language on the use of respirators approved under international standards and updated the tables.</li> <li>○ Combined sections on limited re-use of N95 respirators for tuberculosis and then COVID-19 patients. Added more details surrounding limited re-use.</li> </ul> </li> </ul>
	<p>Allocating masks</p> <ul style="list-style-type: none"> <li>● Stocking practices (including monitoring)</li> </ul> <p>Conserving</p> <ul style="list-style-type: none"> <li>● Use beyond the recommended duration (extended use)</li> </ul> <p>Re-using</p> <ul style="list-style-type: none"> <li>● Decontamination and reusing by others</li> </ul>	<p><a href="#">Several strategies can be used to address personal protective equipment, including masks, shortages during a pandemic from optimizing supplies to conserving and re-using masks</a> (U.S. - Emergency Care Research Institute)</p> <p><b>Abstract</b></p> <p>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.</p> <p>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 <a href="#">searchable directory</a> of local health departments on its website.</p> <p>The Centers for Disease Control and Prevention (CDC) provides guidance on <a href="#">Strategies for Optimizing the Supply of PPE</a>, 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), <a href="#">Strategies for Optimizing the Supply of N95 Respirators: Crisis/Alternate Strategies</a>, and recommendations for <a href="#">extended use and reuse of N95 respirators</a>. See also the recording of ECRI's March 25, 2020, program <a href="#">COVID-19 and Medical Devices: Safe Respirator Usage When Supplies Are Short</a>; around 18 minutes into the program, ECRI addresses considerations surrounding the N-95 respirator shortage.</p> <p>Primary care practices may consider reaching out to local ambulatory surgery centers, medical spas, and <a href="#">dental practices</a> 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.</p> <p>The <a href="#">100 Million Mask Challenge</a> 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.</p>
	<p>Using masks</p> <ul style="list-style-type: none"> <li>● Supporting correct use</li> </ul> <p>Re-purposing</p> <ul style="list-style-type: none"> <li>● Alternative materials</li> </ul>	<p><a href="#">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</a> (Joanna Briggs Institute Evidence Summary)</p> <p><b>Best practice recommendations</b></p> <ul style="list-style-type: none"> <li>● 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)</li> <li>● The wearing of masks or respirators by uninfected persons in the general community are not recommended. (Grade B)</li> </ul>

Type of document	Relevant to question	Abstract and link to full text
		<ul style="list-style-type: none"> <li>• 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)</li> <li>• Masks should be changed immediately when they become damp. (Grade B)</li> <li>• Single use masks should be discarded immediately and never re-used. (Grade B)</li> <li>• If a mask is worn, it should be placed to cover the mouth and nose and tied securely to minimize any gaps. (Grade B)</li> <li>• 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)</li> <li>• 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)</li> </ul>
	Using masks <ul style="list-style-type: none"> <li>• Supporting correct use</li> </ul> Re-purposing masks <ul style="list-style-type: none"> <li>• Alternative materials</li> </ul>	<p><a href="#">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)</a></p> <p><b>Abstract</b> 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.</p>
	Using masks <ul style="list-style-type: none"> <li>• Supporting correct use</li> </ul> Re-purposing masks <ul style="list-style-type: none"> <li>• Medical mask</li> </ul>	<p><a href="#">Some staff working in points of entry at airports, ports, and ground crossing should be wearing medical masks (e.g., screeners, interviewers, cleaners) (WHO)</a></p> <p><b>Abstract</b> 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.</p>
	Using masks <ul style="list-style-type: none"> <li>• Supporting correct use</li> </ul> Re-purposing <ul style="list-style-type: none"> <li>• Medical mask</li> <li>• Alternative materials</li> </ul>	<p><a href="#">Medical masks should be reserved for healthcare workers (WHO)</a></p> <p><b>Abstract</b> 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.</p>
	Using masks <ul style="list-style-type: none"> <li>• Supporting correct use</li> </ul> Re-purposing <ul style="list-style-type: none"> <li>• Alternative materials</li> </ul>	<p><a href="#">Evidence is inconclusive about effectiveness of cloth face coverings worn by the public (U.S. - Emergency Care Research Institute)</a></p> <p><b>Abstract</b> 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.</p>



Type of document	Relevant to question	Abstract and link to full text
	Using masks <ul style="list-style-type: none"> <li>Supporting correct use</li> </ul> Re-purposing <ul style="list-style-type: none"> <li>Medical masks</li> </ul>	<p><a href="#">Medical masks should be worn by frontline workers including police and military</a> (Colleges of Medicines of South Africa)</p> <p><b>Key messages</b></p> <ul style="list-style-type: none"> <li>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.</li> <li>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</li> <li>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</li> <li>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.</li> </ul>
	Using masks <ul style="list-style-type: none"> <li>Supporting correct use</li> </ul>	<p><a href="#">Non-healthcare workers should be trained in the correct use of a surgical mask</a> (Public Health England)</p> <p><b>Key messages</b></p> <ul style="list-style-type: none"> <li>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</li> <li>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</li> <li>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</li> <li>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</li> <li>wash hands regularly with soap and water for 20 seconds, and after removing gloves, aprons and other protection used while cleaning</li> </ul>
	Using masks <ul style="list-style-type: none"> <li>Supporting correct use</li> </ul> Re-purposing <ul style="list-style-type: none"> <li>Medical masks</li> <li>Alternative materials</li> </ul>	<p><a href="#">Recommendations for facemask use among the general public in community settings were inconsistent in a comparison of recommendations from different jurisdictions</a> (multi-country comparison of guidelines)</p> <p><b>Abstract</b></p> <p>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 (<a href="#">panel</a>). 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</p>

Type of document	Relevant to question	Abstract and link to full text
		<p>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.</p>

## REFERENCES

- 1 Ontario Health (Quality). April 3, 2020. [3D Printing of N95 Respirators and Face Shields: Supplemental Information](#).
- 2 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 3 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 4 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 5 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 6 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 7 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 8 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 9 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 10 Marasinghe, K. M., . March 7, 2020. [A systematic review investigating the effectiveness of face mask use in limiting the spread of COVID-19 among medically not diagnosed individuals: shedding light on current recommendations provided to individuals not medically diagnosed with COVID-19](#). PREPRINT (Version 1).
- 11 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 12 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 13 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 14 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 15 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 16 Houghton C, Meskell P, Delaney H, Smalle M, Glenton C, Booth A, Chan XHS, Devane D, Biesty LM. [Barriers and facilitators to healthcare workers' adherence with infection prevention and control \(IPC\) guidelines for respiratory infectious diseases: a rapid qualitative evidence synthesis](#). Cochrane Database of Systematic Reviews 2020, Issue 4. Art. No.: CD013582.
- 17 Verbeek JH, Rajamaki B, Ijaz S, Sauni R, Toomey E, Blackwood B, Tikka C, Ruotsalainen JH, Kilinc Balci FS. [Personal protective equipment for preventing highly infectious diseases due to exposure to contaminated body fluids in healthcare staff](#). Cochrane Database of Systematic Reviews 2020, Issue 4. Art. No.: CD011621.
- 18 Houghton C, Meskell P, Delaney H, Smalle M, Glenton C, Booth A, Chan XHS, Devane D, Biesty LM. [Barriers and facilitators to healthcare workers' adherence with infection prevention and control \(IPC\) guidelines for respiratory infectious diseases: a rapid qualitative evidence synthesis](#). Cochrane Database of Systematic Reviews 2020, Issue 4. Art. No.: CD013582.
- 19 Bartoszko JJ, Farooqi MAM, Alhazzani W, Loeb M. 4 Apr 2020. [Medical masks vs N95 respirators for preventing COVID-19 in healthcare workers: A systematic review and meta-analysis of randomized trials](#) [published online ahead of print]. Influenza Other Respir Viruses.
- 20 Greenhalgh T, Chan XH, Khunti K, et al. 30 March 2020. [What is the efficacy of standard face masks compared to respirator masks in preventing COVID-type respiratory illnesses in primary care staff?](#)
- 21 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 22 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 23 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 24 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)

- 25 Ontario Agency for Health Protection and Promotion (Public Health Ontario). 2020. [Universal mask use in health care settings and retirement homes](#). Toronto, Ontario.
- 26 Canadian Agency for Drugs and Technologies in Health. April 27, 2020. [Optimization of N95 Respirator Masks during Supply Shortages – Round Up \(CADTH Horizon Scan\)](#). Ottawa.
- 27 Centers for Disease Control and Prevention. 27 March 2020. [Recommended Guidance for Extended Use and Limited Reuse of N95 Filtering Facepiece Respirators in Healthcare Settings](#).
- 28 ECRI. 20 March 2020. [Clinical Evidence Assessment: Safety of Extended Use and Reuse of N95 Respirators](#).
- 29 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 30 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 31 McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- 32 Ontario Health (Quality). April 11, 2020. [Recommendations on Optimizing the Supply of Personal Protective Equipment During the COVID-19 Pandemic](#).
- 33 Canadian Agency for Drugs and Technologies in Health. April 27, 2020. [Optimization of N95 Respirator Masks during Supply Shortages – Round Up \(CADTH Horizon Scan\)](#). Ottawa.
- 34 Trillium Health Partners and Institute for Better Health. 6 April 2020. IBH Evidence Summary on N95 Reprocessing – Draft. Personal Communication.
- 35 Ontario Agency for Health Protection and Promotion (Public Health Ontario). 4 April 2020. [COVID-19 – What We Know So Far About...Reuse of Personal Protective Equipment](#).
- 36 ECRI. 20 March 2020. [Clinical Evidence Assessment: Safety of Extended Use and Reuse of N95 Respirators](#).
- 37 ECRI. 20 March 2020. [Clinical Evidence Assessment: Safety of Extended Use and Reuse of N95 Respirators](#).
- 38 Canadian Agency for Drugs and Technologies in Health. April 27, 2020. [Optimization of N95 Respirator Masks during Supply Shortages – Round Up \(CADTH Horizon Scan\)](#). Ottawa.
- 39 Trillium Health Partners and Institute for Better Health. 6 April 2020. IBH Evidence Summary on N95 Reprocessing – Draft. Personal Communication.
- 40 Ontario Agency for Health Protection and Promotion (Public Health Ontario). 4 April 2020. [COVID-19 – What We Know So Far About...Reuse of Personal Protective Equipment](#).
- 41 Canadian Agency for Drugs and Technologies in Health. April 27, 2020. [Optimization of N95 Respirator Masks during Supply Shortages – Round Up \(CADTH Horizon Scan\)](#). Ottawa.
- 42 Trillium Health Partners and Institute for Better Health. 6 April 2020. IBH Evidence Summary on N95 Reprocessing – Draft. Personal Communication.
- 43 Ontario Agency for Health Protection and Promotion (Public Health Ontario). 4 April 2020. [COVID-19 – What We Know So Far About...Reuse of Personal Protective Equipment](#).
- 44 ECRI. 20 March 2020. [Clinical Evidence Assessment: Safety of Extended Use and Reuse of N95 Respirators](#).
- 45 Centers for Disease Control and Prevention. 27 March 2020. [Recommended Guidance for Extended Use and Limited Reuse of N95 Filtering Facepiece Respirators in Healthcare Settings](#).
- 46 O'Hearn, K., Gertsman, S., Sampson, M., Webster, R. J., Tsampalieros, A., Ng, R., ... McNally, D., 31 March 2020. [Decontaminating N95 masks with Ultraviolet Germicidal Irradiation \(UVGI\) does not impair mask efficacy and safety: A Systematic Review](#). OSF Preprints.
- 47 ECRI. 20 March 2020. [Clinical Evidence Assessment: Safety of Extended Use and Reuse of N95 Respirators](#).
- 48 Canadian Agency for Drugs and Technologies in Health. April 27, 2020. [Optimization of N95 Respirator Masks during Supply Shortages – Round Up \(CADTH Horizon Scan\)](#). Ottawa.
- 49 Trillium Health Partners and Institute for Better Health. 6 April 2020. IBH Evidence Summary on N95 Reprocessing – Draft. Personal Communication.
- 50 N95DECON. 1 April 2020. [COVID N95 Decon and Reuse – UvC](#).
- 51 Ontario Agency for Health Protection and Promotion (Public Health Ontario). 4 April 2020. [COVID-19 – What We Know So Far About...Reuse of Personal Protective Equipment](#).
- 52 O'Hearn, K., Gertsman, S., Webster, R., Tsampalieros, A., Ng, R. et al. (2020). [Efficacy and Safety of Disinfectants for Decontamination of N95 and SN95 Filtering Facepiece Respirators: A Systematic Review](#).
- 53 ECRI. 20 March 2020. [Clinical Evidence Assessment: Safety of Extended Use and Reuse of N95 Respirators](#).
- 54 Canadian Agency for Drugs and Technologies in Health. April 27, 2020. [Optimization of N95 Respirator Masks during Supply Shortages – Round Up \(CADTH Horizon Scan\)](#). Ottawa.
- 55 Trillium Health Partners and Institute for Better Health. 6 April 2020. IBH Evidence Summary on N95 Reprocessing – Draft. Personal Communication.

- <sup>56</sup> Ontario Agency for Health Protection and Promotion (Public health Ontario). 4 April 2020. [COVID-19 – What We Know So Far About...Reuse of Personal Protective Equipment](#).
- <sup>57</sup> N95DECON. 2 April 2020. [COVID N95 Decon and Reuse – Hydrogen Peroxide Vapor and Hydrogen Peroxide Gas Plasma](#).
- <sup>58</sup> Gertsman, S., Agarwal, A., O'Hearn, K., Webster, R. J., Tsampalieros, A., Barrowman, N., ... McNally, D. 10 April 2020. [Microwave- and Heat-Based Decontamination of N95 Filtering Facepiece Respirators \(FFR\): A Systematic Review](#). OSF Preprints.
- <sup>59</sup> Canadian Agency for Drugs and Technologies in Health. April 27, 2020. [Optimization of N95 Respirator Masks during Supply Shortages – Round Up \(CADTH Horizon Scan\)](#). Ottawa.
- <sup>60</sup> N95DECON. 2 April 2020. [COVID N95 Decon and Reuse – Heat and Humidity](#).
- <sup>61</sup> Ontario Agency for Health Protection and Promotion (Public health Ontario). 4 April 2020. [COVID-19 – What We Know So Far About...Reuse of Personal Protective Equipment](#).
- <sup>62</sup> O'Hearn, K., Gertsman, S., Webster, R., Tsampalieros, A., Ng, R. et al. (2020). [Efficacy and Safety of Disinfectants for Decontamination of N95 and SN95 Filtering Facepiece Respirators: A Systematic Review](#).
- <sup>63</sup> Gertsman, S., Agarwal, A., O'Hearn, K., Webster, R. J., Tsampalieros, A., Barrowman, N., ... McNally, D. 10 April 2020. [Microwave- and Heat-Based Decontamination of N95 Filtering Facepiece Respirators \(FFR\): A Systematic Review](#). OSF Preprints.
- <sup>64</sup> Canadian Agency for Drugs and Technologies in Health. April 27, 2020. [Optimization of N95 Respirator Masks during Supply Shortages – Round Up \(CADTH Horizon Scan\)](#). Ottawa.
- <sup>65</sup> McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- <sup>66</sup> McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- <sup>67</sup> Canadian Agency for Drugs and Technologies in Health. April 27, 2020. [Optimization of N95 Respirator Masks during Supply Shortages – Round Up \(CADTH Horizon Scan\)](#). Ottawa.
- <sup>68</sup> Canadian Agency for Drugs and Technologies in Health. April 27, 2020. [Optimization of N95 Respirator Masks during Supply Shortages – Round Up \(CADTH Horizon Scan\)](#). Ottawa.
- <sup>69</sup> McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- <sup>70</sup> McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- <sup>71</sup> Personal communication from Ministry of Emergency Operations. April 29, 2020.
- <sup>72</sup> Ontario Hospitals Association. May 1, 2020. PPE Decontamination Meeting Notes. Personal Communication.
- <sup>73</sup> Jefferson T, Jones M, Lubna A, Ansari A, et al. 7 April 2020. [Physical interventions to interrupt or reduce the spread of respiratory viruses. Part 1 - Face masks, eye protection and person distancing: systematic review and meta-analysis](#). Pre-print.
- <sup>74</sup> Bartoszko JJ, Farooqi MAM, Alhazzani W, Loeb M. 4 Apr 2020. [Medical masks vs N95 respirators for preventing COVID-19 in healthcare workers: A systematic review and meta-analysis of randomized trials](#) [published online ahead of print]. Influenza Other Respir Viruses.
- <sup>75</sup> Greenhalgh T, Chan XH, Khunti K, et al. 30 March 2020. [What is the efficacy of standard face masks compared to respirator masks in preventing COVID-type respiratory illnesses in primary care staff?](#)
- <sup>76</sup> Canadian Agency for Drugs and Technologies in Health. April 27, 2020. [Optimization of N95 Respirator Masks during Supply Shortages – Round Up \(CADTH Horizon Scan\)](#). Ottawa.
- <sup>77</sup> Ontario Health (Quality). April 11, 2020. [Recommendations on Optimizing the Supply of Personal Protective Equipment During the COVID-19 Pandemic](#).
- <sup>78</sup> Wilson MG, Gauvin FP, Moat KA, Waddell K, Mansilla C, Wang Q, Lavis JN. 29 April 2020. [COVID-19 rapid evidence profile #4: What are the most effective non-medical masks for preventing community transmission of COVID-19, and should they be required for all of society?](#) Hamilton: McMaster Health Forum.
- <sup>79</sup> Usher Network for COVID-19 Evidence Reviews. 22 April 2020. [Which occupations and activities might benefit from mask wearing to reduce the transmission of COVID-19?](#) University of Edinburgh and Usher Institute.
- <sup>80</sup> Waddell K, Gauvin FP, Wilson MG, Moat KA, Mansilla C, Wang Q, Lavis JN. 29 April 2020. [COVID-19 rapid evidence profile #5: What is known about the use of medical masks by essential non-medical workers to prevent community transmission of COVID-19?](#) Hamilton: McMaster Health Forum.
- <sup>81</sup> Wilson MG, Gauvin FP, Moat KA, Waddell K, Mansilla C, Wang Q, Lavis JN. 29 April 2020. [COVID-19 rapid evidence profile #4: What are the most effective non-medical masks for preventing community transmission of COVID-19, and should they be required for all of society?](#) Hamilton: McMaster Health Forum.

- 
- <sup>82</sup> Wilson MG, Gauvin FP, Moat KA, Waddell K, Mansilla C, Wang Q, Lavis JN. 29 April 2020. [COVID-19 rapid evidence profile #4: What are the most effective non-medical masks for preventing community transmission of COVID-19, and should they be required for all of society?](#) Hamilton: McMaster Health Forum.
- <sup>83</sup> Wilson MG, Gauvin FP, Moat KA, Waddell K, Mansilla C, Wang Q, Lavis JN. 29 April 2020. [COVID-19 rapid evidence profile #4: What are the most effective non-medical masks for preventing community transmission of COVID-19, and should they be required for all of society?](#) Hamilton: McMaster Health Forum.
- <sup>84</sup> Waddell K, Gauvin FP, Wilson MG, Moat KA, Mansilla C, Wang Q, Lavis JN. 29 April 2020. [COVID-19 rapid evidence profile #5: What is known about the use of medical masks by essential non-medical workers to prevent community transmission of COVID-19?](#) Hamilton: McMaster Health Forum.
- <sup>85</sup> McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- <sup>86</sup> Wilson MG, Waddell K, Gauvin FP, Mansilla, C, Moat KA, Wang Q, Lavis JN. 15 May 2020. [COVID-19 rapid evidence profile #10: What screening approaches can be used in non-healthcare settings \(e.g., universities, stores and office settings\) to identify people who may have COVID-19 and need to take appropriate action?](#) Hamilton: McMaster Health Forum.
- <sup>87</sup> Ontario Agency for Health Protection and Promotion (Public Health Ontario). April 27, 2020. [Masking for source control of COVID-19: considerations for workers at non-healthcare settings](#). Toronto, ON: Queen's Printer for Ontario.
- <sup>88</sup> McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- <sup>89</sup> McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)
- <sup>90</sup> McMaster Health Forum/Rapid-Improvement Support and Exchange. April 30, 2020. COVID-19 Rapid Evidence Profile #6: [What is known about strategies for supporting the use of masks under shortage conditions to prevent COVID-19?](#)