Concerns around public health recommendations on face mask use among individuals who are not medically diagnosed with COVID-19 supported by a systematic review search for evidence.

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Abstract

Background

Contradicting and inconsistent public health recommendations regarding face mask use have been provided to individuals who are not yet medically diagnosed with COVID-19, which is significantly a large population. 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 strictly do not recommend their use to limit the transmission of COVID-19 among individuals who are not medically diagnosed with COVID-19. This paper critically analyses public health recommendations provided to this population regarding face mask use by public health and health professionals of different countries supported by a systematic review that searched for evidence on face mask use among this specific population in limiting the spread of COVID-19.

Methods

To carry out the systematic review portion of this paper, 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.

Results

The systematic review search did not find any studies that investigated the effectiveness of face mask use in limiting the spread of COVID-19 among those who are not medically diagnosed with COVID-19 to support current public health recommendations.

Conclusions

The finding of the systematic review search, which is a lack of scientific evidence, questions the basis of inconsistent public health recommendations that have been provided to the public at a very early yet a crucial stage of an outbreak. A closer attention need to be given to the procedures and practices behind providing public health guidelines and recommendations during an outbreak by public health and health
professionals around the world. This paper calls for 1) evidence-based public health recommendations; 2) considerations when providing public health recommendations in the absence of evidence; 3) evidence and knowledge transparency on current public health recommendations; 4) global alignment on public health recommendations; and 5) further research to strengthen public health recommendations.

Background
Contradicting and inconsistent public health recommendations regarding face mask use have been provided to individuals who are not yet medically diagnosed with Coronavirus disease 2019 (COVID-19)¹ around the world, which is a very large population, at a very early yet a crucial stage of an outbreak (through January and February 2020). Due to inconsistent and contradicting recommendations, there is confusion and lack of clarity around the use and effectiveness of face masks in limiting the spread of COVID-19 among populations who are not yet medically diagnosed with COVID-19. This paper critically analyses public health recommendations that have been provided to this population regarding face mask use supported by a systematic review that searched for evidence on face mask use among this specific population in limiting the spread of COVID-19. This research is significant for public health because public health recommendations must be evidence-based, transparent and globally aligned from the very beginning of an infectious disease outbreak. This paper shows that current public health recommendations meet none of these requirements which is concerning and should be avoided in future outbreaks.

Medical or surgical masks² or N95 respirators,³ hereinafter referred to as face masks, are being used by individuals who are not medically diagnosed with COVID-19 as a means to limit the spread of the virus in several countries across the globe. The use of face masks as a means to limit the spread of COVID-19 has been discouraged or not recommended for populations who are not medically diagnosed with COVID-19 in various countries. While countries such as Australia, Canada and the United States of America do not recommend that this specific population wear face masks to limit the potential spread of COVID-19, health officials in countries like China, Indonesia, and the Philippines have supported the use of face masks to limit the spread of COVID-19 among this specific population.
Recommendations that have been provided by health professionals regarding wearing a face mask to limit the spread of COVID–19 among individuals who are not medically diagnosed with COVID–19 include a mix of varying information as provided below.

| The Source                                                                 | Recommendation                                                                                                                                                                                                 |
|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The former health secretary, The Philippines                            | “It [surgical mask] is not 100 percent effective because there are still gaps where air can’t breathe than not wearing any. It’s about 90 percent effective. It may be safe not to wear areas where one is sure that no person with coronavirus has entered. If you are at the mall, who else are there if they came from China and has the coronavirus.” [5] |
| Health Ministry Disease Control and Environmental Health Directorate General, Indonesia | “As long as we use it correctly, a [surgical] mask is enough protection from the virus or bio-masks should be used mainly by sick people to prevent the spread of the virus while cough also protects healthy people from being infected while in public places.” [8] |
| China                                                                    | “At least two Chinese provinces now require face masks to be worn in public.” [7]                                                                                                                                 |
| British Columbia Centers for Disease Control and Prevention’s (BCCDC), Canada | “It may be less effective to wear a mask in the community when a person is not sick then may give a person a false sense of security and are likely to increase the number of times touch their own face – to adjust the mask, etc.” [3] |
| The chief medical officer of Ontario, Canada                            | “We never recommend wearing a mask in public” because many people don’t use them properly. Reaching underneath them to touch your face, for instance, spreads germs. N95 respirators are named because they’re designed to stop 95 percent of small particles from reaching the throat only if they fit properly, which they won’t for children or people with facial hair.” [1] |
| University of Toronto, Immunology professor, Canada                     | “The issue with [the surgical mask] is it obviously doesn’t protect your eyes and they’re not there’s an opportunity for something to come within areas where it’s not tightly fitted, for example, spreads germs. N95 respirators are named because they’re designed to stop 95 percent of small particles from reaching the throat only if they fit properly, which they won’t for children or people with facial hair.” [9] |
| The Center for the National Center for Immunization and Respiratory Diseases, USA | “We don’t routinely recommend the use of face masks by the public to prevent respiratory illness certainly are not recommending that at this time for this new virus. We want our actions to be based and appropriate to the current circumstance which did not justify the use of face masks who have not been directly exposed to the virus.” [2] |
| The state of New South Wales, Australia                                 | “Face masks are not recommended for the general population.” [4]                                                                                                                                               |
| The World Health Organization (WHO)                                     | “The use of medical masks or N95 respirators as one of the prevention measures to limit the spread of certain respiratory diseases including the Novel Coronavirus (2019-nCoV) in affected area people wear a mask only if you are taking care of a person with suspected 2019-nCoV infection.” [8] |

It is evident from the above information that health officials in China, Indonesia, and the Philippines are in support of face mask use to limit the spread of COVID–19 among those who are not medically diagnosed with COVID–19. The information provided to the public in countries like Australia, Canada, the United States of America and the WHO provide a mixture of recommendations but mostly not in support of face mask use among individuals who are not medically diagnosed with COVID–19.

It is important to make a note of the population these recommendations have been provided to. This population is generally called “healthy individuals”. However, they will be referred to as “individuals who are not medically diagnosed with COVID–19” in this paper because a person can be “healthy” from outside but can be carrying the virus. This population, “individuals who are not medically diagnosed with COVID–19”, include those who may have been exposed to the virus and are asymptomatic; pre-symptomatic; symptomatic but have not yet been diagnosed with COVID–19 and
therefore not aware that they have COVID-19 and; those who have not been exposed to the virus. The first three groups of individuals are impossible to distinguish from one another in terms of whether they carry COVID-19 and a risk of spreading the virus in public spaces. This paper discusses the concerns around the contradicting public health recommendations that have been provided to this specific population regarding face mask use followed by a systematic review that looks for evidence in order to evaluate current public health recommendations in the context of available evidence.

Methods
To carry out the systematic review portion of this paper, databases Cochrane Library (1974—2nd week of March 2020), EMBASE (1974—2nd week of March 2020), Google Scholar (2004—2nd week of March 2020), PubMed (1950—2nd week of March 2020) and Scopus (1966—2nd week of March 2020) were searched for relevant studies. Two groups of keywords were combined: those relating to COVID-19 and face masks (Figure 1). Retrieved articles were searched for relevant articles by screening the title and abstract by one reviewer.

Insert Figure 1: Database search terms.

Inclusion criteria
1) Randomized control trials (RCTs), cohort, retrospective or prospective studies; 2) studies that evaluated the effectiveness of face masks in limiting the spread of COVID-19 in community settings; and 3) studies that were in English.

Exclusion criteria
If the abstract did not relate to the effectiveness of face masks in limiting the spread of COVID-19 in community settings, the study was excluded. Commentaries were excluded.

Results
This systematic review search did not find any studies that investigated the effectiveness of face masks in limiting the spread of COVID-19 among those who are not medically diagnosed with COVID-19 to support current public health recommendations (Figure 2). The lack of evidence on the use of face masks in limiting the spread of COVID-19 among this population and how this finding has an effect on the current public health recommendations is discussed below.
Discussion

The systematic review portion of this paper did not find any research studies that investigated the effectiveness of face mask use in tackling this specific virus in this specific population. This finding questions the basis of contradicting and varying public health recommendations that have been provided by public health and health professionals on face mask use around the world since the beginning of COVID–19 outbreak. The concerns around current public health recommendations in the context of this finding is discussed below.

Evidence-based public health recommendations

One of the important requirements for further research on this subject is the need for evidence-based public health recommendations. Practicing evidence-based approaches in public health increases the availability of higher quality information, likelihood of successful prevention programs and policies, and efficiency in the use of resources. [10] [11] [12] [13] [14] Current literature states that public health professionals should always integrate scientific evidence when planning and implementing programs, developing policies and evaluating progress, which also applies to when providing public recommendations. [14] [15] Therefore, it is best that recommendations are based on best available scientific evidence whether the recommendation is to wear or not to wear face masks in community settings among different types of sample populations. Recommendations that are not supported by scientific evidence can create controversy and confuse the public as well as health authorities around the world, creating contradicting and inconsistent recommendations. Such recommendations not only create confusion and controversy but also increase the risk of unnecessary spread of the infection.

As an example, in a situation where an asymptomatic, pre-symptomatic or symptomatic individual with COVID–19 who has not yet been medically diagnosed, who is not wearing a face mask, coughs or sneezes without covering their face, they could be releasing respiratory droplets. WHO states that “people can also catch COVID–19 if they breathe in droplets from a person with COVID–19 who coughs out or exhales droplets. This is why it is important to stay more than 1 meter (3 feet) away from a person who is sick.” [16] If these individuals are not wearing a face mask, the risk of spreading the
infection through coughing or sneezing out droplets is higher. On the other hand, if healthy individuals in close proximity are not wearing face masks, they may be at a higher risk of contracting COVID-19 through respiratory droplets. [16] This kind of transmission is not rare especially in public transit during rush hour in any part of the world.

By providing recommendations against the use of face mask in the above situation, health authorities may be implying that wearing a face mask is not effective in protecting a healthy individual in this situation. [1] [2] [3] Health officials in countries like the Philippines have brought attention to the possibility of this kind of transmission and recommended the use of face masks. [5] Since the beginning of the outbreak, the WHO provides a recommendation stating that “relatives or caregivers to individuals with suspected 2019-nCoV infection with mild respiratory symptoms should wear a medical mask when in the same room with the affected individual” suggesting that wearing a medical mask is useful in preventing the transmission of COVID-19 to those who are not medically diagnosed with the virus in some scenarios. [17] This recommendation has likely been provided to err on the side of caution by public health entities. However, it is questionable why the same recommendation does not apply to those who have not yet been exposed to the virus and are not relatives of an individual suspected with COVID–19, who can still be exposed to an infected individual in public spaces such as in the above public transit scenario. If face masks recommended above are effective in keeping out droplets between a sick family member and healthy family member, why are the same face masks ineffective in public spaces where there might be infected individuals who are not wearing face masks? Does wearing a face mask protect healthy individuals in close proximity in public spaces at least to some extent? Is not wearing a face mask at all in public spaces beneficial than wearing one? These are questions that the general population likely have and should have clear answers to.

Currently, there is no known effective approach to prevent such type of transmission to healthy individuals other than to assume that asymptomatic, pre-symptomatic or symptomatic individuals who have not yet been medically diagnosed follow recommended precautionary methods such as hand hygiene, cough and sneeze etiquette, and wearing a face mask. It is important to note here that asymptomatic, pre-symptomatic or symptomatic individuals who have not been medically diagnosed
are impossible to distinguish from one another in terms of whether they carry COVID–19 and a risk of spreading the virus in public spaces. To be unsure of how to prevent the above type of transmission is dangerous during an outbreak like COVID–19.

As demonstrated in the above information, the evidence behind recommendations provided regarding face mask use to those who are not medically diagnosed with COVID–19 is unclear and inconsistent, bringing uncertainty around the current recommendations. Further scientific research on face mask use is imperative to answer the above questions and concerns to resolve the controversy and lack of clarity around face mask use and to provide evidence-based public health recommendations on whether to wear or not to wear face masks among different populations amid a fast-spreading outbreak like COVID–19.

Providing public health recommendations on the use of face masks in the absence of evidence

When providing public health recommendations relating to a novel virus in the absence of evidence, there are important things to keep in mind. To answer the concerns associated with the use of face masks, public health and health professionals must question if the potential risks associated with wearing face masks incorrectly outweigh the potential benefits of wearing face masks correctly when followed by other precautionary practices. Potential risks of face mask use as identified by public health and health professionals include: increased possibility of spreading germs due to the misuse of face masks such as touching the outside of the face masks and retouching underneath the face mask to touch the face; increased likelihood of people touching their own faces because of the face masks, for example to adjust the masks; establishment of a false sense of security among those who wear face masks; and ineffectiveness due to unfitting of face masks especially among children and those with facial hair. [17] [1] [2] [3] [9] [18] In the case where potential benefits of wearing face masks appropriately cannot be outweighed against the risks of wearing face masks, taking actions to eliminate potential risks associated with wearing face masks may be a safer approach rather than recommending the public not to wear a face mask at all.

Furthermore, when providing recommendations to the public about the use of face masks to limit the transmission of COVID–19, it is important to give special consideration to vulnerable populations and
those who are often around these vulnerable populations such as individuals in the community who have immunocompromised family members. People with pre-existing conditions such as cancer, diabetes, heart disease and renal or chronic lung disease appear to be more vulnerable to becoming severely ill with COVID-19 directly or through a family member. [19] [20] It may be best to err on the side of caution when making recommendations to the public regarding face mask use in the absence of evidence to reduce the risk of potential transmission to the most vulnerable populations.

Evidence and knowledge transparency of public health recommendations with the public

Transparency during a health emergency is extremely important because information plays an important role in maintaining core public health objectives. [21] During a situation where the public is at risk of a real or potential health threat, there might be delays in obtaining treatment options, interventions may be lengthy and there may be limited resources available. [21] Public recommendations and guidelines, therefore, is the most important tool available in managing a risk during an outbreak. [21] According to public health professionals, providing proactive guidelines and having transparency is an organizational responsibility and it is also the most successful method to grasp a control of public discourse, media reports and customer relations related to the situation. [21] Public recommendations and guidelines, therefore, is the most important tool available in managing a risk during an outbreak. [21] According to public health professionals, providing proactive guidelines and having transparency is an organizational responsibility and it is also the most successful method to grasp a control of public discourse, media reports and customer relations related to the situation. [21] Scholars in the field of Public Health Ethics and Pandemic Influenza Planning have also emphasized the importance of transparency in managing infectious disease outbreaks. [21][22] During an infectious disease outbreak, transparency provides the right information needed to survive the emergency. [21] [23] [24] Transparency is also an important component of procedural fairness in decision-making and priority setting during an outbreak. [21] [23] [24] Scholars state that “transparency is also a necessary, if not sufficient, condition for accountable decision-making and for the promotion of public trust.” [21] Transparency about the unknown and the known are both equally important to build and promote public trust. [21]

Therefore, in the case of the COVID–19 outbreak, whether recommendations are provided in the absence of evidence or whether they are evidence-based must be transparent to the public. Where there is evidence transparency, the public is more likely to understand what scientific evidence recommendations are based on and therefore, be more confident in adhering to recommendations.
For example, in the case of medical professionals’ request to halt the hoarding of face masks among the public, merely saying “masks do not help” has not been helpful in preventing the public from continuing to buy face masks, perhaps unnecessarily. [25] [26] With scientific evidence of their ineffectiveness in limiting the spread of COVID–19 among those who are not medically diagnosed with COVID–19, public health and health professionals can be consistent and confident when recommending the public not to buy face masks and as a result avoid situations such as running out of face masks for healthcare workers.

Some of the recommendations provided to the public suggest that the incorrect use of face masks may have potential risks as discussed earlier. These potential risks can be minimized by educating the public about the risks and how to correctly use face masks to prevent the risks. A common concern brought up in current recommendations is about the false sense of security that face masks may bring to those who use them. [17] [2] [3] A false sense of security is the feeling of being safer than one really is. [27] In the context of COVID–19 and face mask use, a false sense of security means that the individuals may feel that they are safe from contracting COVID–19 because they are wearing face masks while that may not be the case. In the case of such concern, the public must be educated about the “false sense of security” that wearing a face mask may bring to individuals and how it may contribute to the increased risks associated with wearing face masks or neglecting other precautionary actions. Some recommendations emphasize that other precautionary methods are more important than wearing a face mask while some suggest face masks are only effective in combination with other precautionary practices. [2] [9] All of the above information must be shared effectively with the public through reliable media when making public health recommendations. It is imperative to be transparent with the public about the current evidence and knowledge public health recommendations are based on in order to successfully achieve the goals behind the recommendations.

**Global alignment on public health recommendations**

Public health recommendations must align globally. Varying recommendations can have a negative effect on countries around the world, especially in developing countries. In some developing
countries, there is a severe lack of dissemination of credible information to the public as well as a concerning lack of knowledge among the general population to be able to identify and distinguish credible information from noncredible information. In these populations, most people tend to trust what is typically seen on social media or other online platforms. For example, a consult physician in Sri Lanka says that, “containing the panic and dissemination of misinformation has proved tougher than fighting the actual disease [COVID-19].” [28] [29]

In the case of face mask use, when people in developing countries observe on online platforms, a wide use of face masks to limit the spread of COVID-19 or recommendations advising the use of face masks, they may be likely to follow these recommendations without questioning the evidence behind the practices or recommendations. This may be the case especially when recommendations are coming from sources from developed countries. Some people may assume that the practices are evidence-based because they are coming from developed countries. Influenced by what they see on online platforms, the public of countries around the world may assume that merely wearing face masks will protect them from contracting COVID-19. Similarly, if there are recommendations to not wear face masks, those recommendations might also be followed without taking into consideration other advice that should follow along such as practicing hand hygiene and respiratory hygiene.

In developing countries with less advanced health care systems, confusion due to varying recommendations can lead to having a worse negative impact on their population as well as healthcare systems. Considering these factors, global alignment on public health recommendations and decisions among public health professionals and entities is crucial when proving recommendations amid an outbreak such as COVID-19.

*Future research on face mask use*

Further investigation into the effectiveness of face mask use among those who are not medically diagnosed with COVID-19 is important and timely for many reasons. If currently available face masks are not effective in limiting the spread of COVID-19 among this specific population or have significant limitations to its effectiveness, with advanced technology and innovations, further research can investigate novel approaches to invent and improve the efficiency of face masks to prevent the
transmission of COVID-19 and other coronaviruses. While investigating into the effectiveness of face masks will be beneficial in limiting the spread of COVID-19, further research can open doors to investigating, understanding, and designing more advanced personal protective equipment (PPE) for situations where PPE may be required in community settings. Additional research can help identify and distinguish between the types of face masks that are best for different populations, and address possible stigma and existing cultural differences associated with face mask use. Moreover, information about the effectiveness of face masks will provide health professionals insight into whether there is a need to advise global manufacturers to increase the production of face masks, which addresses growing concerns such as face mask hoarding by the public, limited availability of face masks for healthcare workers, and the need for mandatory control over supply and price of face masks through legislation in countries that recommend the use of face masks to limit the spread of COVID-19. [30] [31] [32]

Although COVID-19 has not been declared as a pandemic yet (as of 25 Feb 2020), in case of a pandemic, knowing the effectiveness of masks ahead of time of the crisis would be extremely useful. While research surrounding the biology, epidemiology and behaviour of the new virus is extremely important and a priority at the moment, studying every method of prevention is equally important as prevention will not only provide the public with knowledge and instructions that they can rely on and confidently practice, but also save lives and reduce suffering and the expenditure of healthcare resources. This research is important, especially today because there is an immense use of face masks among the public around the world despite the uncertainty around the effectiveness of face masks. Such popular practices must be given immediate attention and studied thoroughly.

Limitations

The author had to use information outside of academic literature such as information from media outlets and newspapers (all cited) due to the lack of specific information in academic literature, such as public health recommendations provided to those who are not medically diagnosed with COVID-19 regarding face mask use. While this may be a limitation, sometimes it is imperative to use available information to bring attention to public health concerns. The systematic review search being limited
to the English language is a limitation of this review. It is a possibility that there are research studies published in other languages that have not been translated to English and therefore, are not included in this review. This review being conducted by one reviewer might be a limitation as well, as having more than one reviewer may be advantageous.

Conclusions
The finding of the systematic review search, which is a lack of scientific evidence, questions the basis of inconsistent and contradicting public health recommendations that have been provided to the public at a very early yet a crucial stage of an outbreak. This paper calls for 1) evidence-based public health recommendations; 2) considerations when providing public health recommendations in the absence of evidence; 3) evidence and knowledge transparency with the public on current public health recommendations; 4) global alignment on public health recommendations; and 5) further research for strong public health recommendations. A closer attention need to be given to the procedures and practices behind providing public health guidelines and recommendations during an outbreak by public health and health professionals around the world.

List Of Abbreviations
British Columbia Centers for Disease Control and Prevention (BC CDC)
Cable News Network (CNN)
Centers for Disease Control and Prevention (CDC)
Coronavirus disease 2019 (COVID-19)
Food and Drug Administration (FDA)
Middle East respiratory syndrome coronavirus (MERS-CoV)
Novel Coronavirus (2019-nCoV)
Randomized control trials (RCTs)
World Health Organization (WHO)

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Keshini Madara Marasinghe led and conducted the review and discussed the findings.

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Footnotes
1 Individuals who are “not medically diagnosed with COVID–19” include those who may have been exposed to the virus and are asymptomatic; pre-symptomatic; symptomatic but have not yet been diagnosed with COVID–19 by a healthcare professional therefore may not be aware that they have COVID–19 and; those who have not been exposed to the virus.

2 United States, Centers for Disease Control and Prevention (CDC) describes a surgical mask as a face mask that provides barrier protection against large particle droplets that can be released when a wearer talks, coughs, or sneezes. [33] CDC notes that medical or surgical masks do not effectively filter inhaled small particles, fumes, or vapors. [33] They are “primarily used to protect patients and healthcare workers from people who may have a respiratory infection” according to CDC. [33]

3 The Food and Drug Administration (FDA) of the United States, describes N95 respirators as masks that are designed to “achieve a very close facial fit and very efficient filtration of airborne particles.” [34] N95 respirators block at least 95 percent of very small (0.3 micron) test particles minimizing the wearers’ respiratory exposure to airborne infectious agents. [34] [35] FDA also states that if N95 masks are properly fitted, the filtration capabilities of N95 respirators surpass those of surgical masks. [34] However, even a properly fitted N95 respirator does not completely eliminate the
risk of illness or death according to FDA.[34]

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EMBASE and Cochrane Library (1974 – 2nd week of March 2020) and Cochrane Library (1993 – 2nd week of March): face piece.mp. or exp protective equipment/ OR exp mask/ or exp surgical mask/ or exp face mask/ or Respirator* .mp. or N95.mp. or Respiratory Protective Devices.mp. or Medical Mask.mp. AND 2019-nCoV.mp. or 2019-novel coronavirus.mp. or 2019 novel coronavirus.mp. or covid-19.mp

GoogleScholar (2004 – 2nd week of March 2020): "Face mask" OR mask* OR "Facepiece" OR Respirator* OR N95 OR "Respiratory Protective Devices" OR "Medical Mask" OR "surgical mask" AND "2019-nCoV" OR "2019-novel coronavirus" OR "2019 novel coronavirus" OR "COVID-19"

PubMed (1950 – 2nd week of March 2020): (((((((((((Face mask)[Title/Abstract]) OR mask)[Title/Abstract]) OR Face piece)[Title/Abstract]) OR respirator)[Title/Abstract]) OR N95)[Title/Abstract]) OR "Respiratory Protective Devices"[Title/Abstract]) OR "Medical Mask"[Title/Abstract]) OR "surgical mask"[Title/Abstract]) AND "2019-nCoV"[Title/Abstract]) OR "2019-novel coronavirus"[Title/Abstract]) OR "Wuhan coronavirus" [Title/Abstract]) OR "Wuhan seafood market pneumonia virus"[Title/Abstract]) OR "2019 novel coronavirus"[Title/Abstract]) OR "COVID-19"[Title/Abstract])

Scopus (1966 – 2nd week of March 2020): (TITLE-ABS-KEY ( "Face mask" OR mask* OR "Facepiece" OR Respirator* OR N95 OR "Respiratory Protective Devices" OR "Medical Mask" OR "surgical mask") AND TITLE-ABS-KEY ( "2019-nCoV" OR "2019-novel coronavirus" OR "2019 novel coronavirus" OR "COVID-19"))

Figure 1: Database search terms.

Figure 1

Database search terms.
Figure 2: Schematic diagram of the literature search.

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