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Does wearing a facemask stop or slow down the spread of respiratory viruses?

This Cochrane Review shows that compared with no facemask use, wearing a facemask may make little to no difference in how many people that catches a flu-like illness. It probably makes little to no difference in how many people that have flu confirmed by a laboratory test. Unwanted effects are rarely reported but include discomfort. Furthermore, it may seem that it makes little to no difference what type of facemask is used. This Cochrane Review searched for studies in April 2020 and does not include studies on COVID-19. The evidence presented here can thus not be considered as direct until COVID-19 studies are included in the analyses.

What does the research tell us?

In systematic reviews, available research is collected and critically appraised. The research question in this systematic Cochrane review was: What is the effect of physical measures on the spread of respiratory viruses? This Cochrane review includes a wide range of interventions, but here we have chosen to briefly summarise the effects of wearing facemasks.

Results of **facemasks versus no facemask** show that:

- the use of facemask may make little to no difference in how many people that catch an influenza-like illness (low certainty)
- the use of facemask probably makes little to no difference in how many people that have laboratory-confirmed respiratory virus (moderate certainty)
- there are no studies about the effectiveness of facemasks on the following outcomes: adverse events, deaths, severity of viral illness, absenteeism, hospital admission, and illness-related complications

Table 1. Facemasks compared to no facemasks (among all types of populations and settings)

What happens?	No facemasks	Facemasks	Certainty of evidence[1]
Viral illness - influenza-like illness Compared with wearing no facemask, wearing a facemask may make little to no difference in how many people that catch a flu-like illness	160 per 1000 people	158 per 1000 people (131 to 189)*	⨁⨁◯◯ Low
Viral illness - laboratory-confirmed respiratory virus Compared with wearing no facemask, wearing a facemask probably makes little to no difference in how many people that have flu confirmed by a laboratory test	40 per 1000 people	36 per 1000 people (26 to 50)*	⨁⨁⨁◯ Moderate
Adverse events We are uncertain about the effect on this outcome	Data could not be combined in a meta-analysis. Up to 45% reported discomfort, warmth, respiratory difficulties, humidity, pain, and shortness of breath		
Deaths, severity of viral illness, absenteeism, hospital admission, illness-related complications	Data on these outcomes were not reported in the included studies		

* The confidence interval (95% CI) reflects the extent to which the play of chance may be responsible for an effect estimate from a study. [1] Indicates the extent to which one can be confident that an estimate of effect is correct. Seven studies took place in the community, and two studies in healthcare workers. The current version of the Cochrane Review does not include studies on COVID-19.

Results of N95 respirators versus medical mask show that:

- the use of N95 respirators compared to medical masks may make little to no difference in how many people that catch a flu-like illness (low certainty)
- the use N95 respirators compared to medical masks probably makes little to no difference in how many people that have laboratory-confirmed respiratory virus (moderate certainty)
- there are no studies about the effectiveness of facemasks on the following outcomes: adverse events, deaths, severity of viral illness, absenteeism, hospital admission, and illness-related complications

Table 2. Medical masks compared to N95 respirators (mostly among healthcare workers)

What happens?	Medical masks	N95 respirators	Certainty of evidence[1]
Viral illness - influenza-like illness Compared with wearing medical mask, wearing a N95 respirator may make little to no difference in how many people that catch a flu-like illness	50 per 1000 people	41 per 1000 people (33 to 52)*	⨁⨁◯◯ Low
Viral illness - laboratory-confirmed respiratory virus Compared with wearing medical mask, wearing a N95 respirator probably makes little to no difference in how many people that have flu confirmed by a laboratory test	70 per 1000 people	77 per 1000 people (63 to 94)*	⨁⨁⨁◯ Moderate
Viral illness – clinical respiratory illness We are uncertain about the effect on this outcome because the certainty of the evidence is very low.	We do not report numbers of results of very low certainty		⨁◯◯◯ Very low
Adverse events We are uncertain about the effect on this outcome	Data could not be combined in a meta-analysis. Up to 42% reported discomfort among respirator users compared to nearly 10% of medical masks users.		
Deaths, severity of viral illness, absenteeism, hospital admission, illness-related complications	Data on these outcomes were not reported in the included studies		

* The confidence interval (95% CI) reflects the extent to which the play of chance may be responsible for an effect estimate from a study. [1] Indicates the extent to which one can be confident that an estimate of effect is correct. Four studies were in healthcare workers, and one small study was in the community. The current version of the Cochrane Review does not include studies on COVID-19.

Background

What are respiratory viruses?

Respiratory viruses are viruses that infect the cells in your airways: nose, throat, and lungs. These infections can cause serious problems and affect normal breathing. They can cause influenza, severe acute respiratory syndrome, and COVID-19.

How do respiratory viruses spread?

People infected with a respiratory virus spread virus particles into the air when they cough or sneeze. Other people become infected if they come into contact with these virus particles in the air or on surfaces on which they have landed. Respiratory viruses can spread quickly through a community, through populations and countries causing epidemics, and around the world causing pandemics.

Physical measures to try to stop respiratory viruses spreading between people include:

- to wash your hands often
- to not touch your eyes, nose, or mouth
- to sneeze or cough into your elbow

- to wipe surfaces with disinfectant
- to wear masks, eye protection, gloves, and protective gowns
- to avoid contact with other people (isolation or quarantine)
- to keep a certain distance away from other people (distancing)
- to examine or test people that enter a country for signs of infection (screening)

For the purpose of this "Briefly summarised", we only summarise what the Cochrane Review authors found and presented in their Summary of Findings tables on facemask use.

What is this information based on?

The Cochrane Review authors searched for relevant studies in research databases up to April 1st, 2020. This is an update of a previous Cochrane Review where they identified 44 new studies (randomised controlled trials) with a total of 67 studies (total number of participants not reported). Of these 67 studies, 19 involved facemasks. From these, 15 were reported in Summary of Findings tables and summarised here. Facemask use plus hand hygiene versus control and facemask use plus hand hygiene versus hand hygiene alone are not summarised here because these comparisons were not critically appraised (GRADE) and presented in Summary of Findings tables. For the 15 studies presented in this summary we have extracted PICO information in table 3.

The Cochrane Review authors reported four ongoing studies on facemasks (Wang 2015, NCT04471766; NCT04296643; NCT04337541;) one of which – NCT04337541 – was published (Bundgaard 2020) as the Cochrane Review update was going to press.

Table 3. PICO-information about the systematic review

PICO	What did they search for?	What did they find?
Study design	RCTs (randomised controlled trials)	All 67 studies were RCTs, of which 19 involved facemask use. 15 RCTs were presented in Summary of findings tables (SoFs)
Population	All populations	Community, including students, pilgrims, families, and health care workers. Three of the 15 studies presented in SoFs were among healthcare workers (Ide 2016; Jacobs 2009; MacIntyre 2015), whilst the remaining studies were among non-healthcare workers (students, households, families, or pilgrims).
Intervention and comparison	Physical interventions (including facemasks)	**19 RCTs about facemasks** (Aelami 2015; Aiello 2010; Aiello 2012; Barasheed 2014; Canini 2010; Cowling 2008; Cowling 2008; Ide 2016; Jacobs 2009; Larson 2010; Loeb 2009; MacIntyre 2009; MacIntyre 2011; MacIntyre 2013; MacIntyre 2015; MacIntyre 2016; Radonovich 2019; Simmerman 2011; Suess 2012). **Relevent comparisons presented in Summary of Findings tables**: **Face mask versus no facemask** (10 studies) (Aiello 2010; Aiello 2012; Barasheed 2014; Canini 2010; Cowling 2008; Jacobs 2009; MacIntyre 2009; MacIntyre 2015; MacIntyre 2016; Suess 2012). One study compared catechin-treated masks to no mask (Ide 2016), and one study included cloth masks versus control (third arm in MacIntyre 2015). **Surgical/medical mask and cloth mask and N95/P2** (5 studies) (Loeb 2009; MacIntyre 2009; MacIntyre 2011; MacIntyre 2013; Radonovich 2019). **Other relevant facemask comparisons not presented in Summary of Findings tables:** **Facemask + hand hygiene versus control** (6 studies) (Aelami 2015; Aiello 2012; Cowling 2009; Larson 2010; Simmerman 2011; Suess 2012) **Facemask + hand hygiene versus hand hygiene** (3 studies) (Cowling 2009; Larson 2010; Simmerman 2011) Duration of the intervention among the 15 studies included in this summary, when described, mainly varied from one week to 5 months. Except for 1 study (Radonovich 2019) where health care workers used facemask for 1 year or more when they were in close contact with patients who had acute respiratory illness. Most of the time is also included soap, hand sanitizing, or information material. Control groups usually also got information or educational material.

PICO	What did they search for?	What did they find?
Outcomes	Respiratory illness Influenza-like illness Laboratory-confirmed influenza Harms / adverse events Deaths Severity of viral illness Absenteeism Hospital admission Illness related complications	Analysis were made for the following outcomes: Clinical respiratory illness Influenza-like illness Laboratory-confirmed influenza Harms / adverse events They found no data for the following outcomes from facemask studies: Deaths Severity of viral illness Absenteeism Hospital admission Illness-related complications
Setting	All countries and all settings	Most studies took place during the influenza season during autumn or winter in the community. One study was conducted during H1N1 pandemic season (Suess 2012). One study that was conducted on household individuals (MacIntyre 2009), 5 studies included healthcare workers either in a hospital setting, (Loeb 2009; MacIntyre 2011; MacIntyre 2013), or an outpatient setting (MacIntyre 2009; Radonovich 2019).
Certainty of evidence	They used GRADE to assess the certainty of the evidence.	Very low, low and moderate evidence due to lack of blinding, imprecision and inconsistency.
Relevant COVID-19 studies published after the last update		Bundgaard 2020

All the references to the primary studies are listed in the Jefferson et al. 2020 Cochrane Review.

Systematic review

In systematic reviews you search for and summarise studies that answer a specific research question. The studies are identified, assessed and summarised by using a systematic and predefined approach (read more Cochrane Consumer Network).

Certainty of the evidence (GRADE)

When we summarise studies and present the result (effect estimate), we also need to say something about how certain we are about this result. The certainty of the evidence tells us something about how sure we can be that the result reflects real life or reality. GRADE is a system (or a tool) that we use to make these judgements. Among the elements we judge in GRADE are:

- how well the studies were conducted
- if the studies are large enough
- if the studies are similar enough
- how relevant the studies are
- if all relevant studies have been identified

Reference to the Cochrane Review

Jefferson et al. Physical interventions to interrupt or reduce the spread of respiratory viruses. Cochrane Database of Systematic Reviews 2020, Issue 11. Art. No.: CD006207. DOI: 10.1002/14651858.CD006207.pub5. Accessed 17 March 2021. Available from: https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD006207.pub5/full

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