

RESPIRATORY INFECTION TRANSMISSION (COMMUNITY): FACE MASKS AND RESPIRATORS

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Question

What is the best available evidence regarding the effectiveness of face masks and/or respirators in reducing the transmission of respiratory infection in community settings?

Clinical Bottom Line

One of the characteristics of pandemics is the high incidence of infections in all age groups.¹⁻³ Non-pharmacological interventions have been proposed to decrease the risk of respiratory infection, including influenza and other viruses, when vaccination or specific anti-infective treatments are unavailable.¹ There are two main types of respiratory personal protective equipment (PPE): masks designed to protect the wearer from large respiratory droplets; and respirators (N95 [United States], FFP2 [Europe], KN95 [China] and P2 [Australia and New Zealand]) designed to prevent the inhalation of small airborne particles.² This evidence summary is focused on the use of masks and respirators to reduce transmission of respiratory infection in community settings.¹⁻⁴

- A systematic review found limited evidence for effectiveness of disposable medical face masks (also known as surgical masks), either worn by infected persons or by uninfected persons, for protection against influenza transmission in community settings. The review did not consider the use of respirators.¹ (Level 1) An earlier systematic review examined the use of disposable masks and respirators to prevent transmission of influenza in community and healthcare settings. Among the included randomized controlled trials (RCTs), community data showed disposable medical face mask wearing coupled with hand sanitizer use, reduced the transmission of upper respiratory infection, influenza-like illness, and/or laboratory-confirmed influenza among crowded, urban households, compared with education or hand sanitizer alone. Those in contact with an infected index case in their household who wore a P2 respirator (equivalent rating to an N95 respirator) 'all' or 'most' of the time for the first five days, were less likely to develop an influenza-like illness compared with less frequent users, or those who began hand hygiene, or hand hygiene plus a mask, within 36 hours of the confirmed index case. Observational (case-control) studies evaluated mask and respirator use following the outbreaks of severe acute respiratory syndrome (SARS) in 2003 produced unclear results. The authors of this systematic review concluded that limiting the transmission of influenza in community settings requires a multifaceted approach, of which masks and respirators are but one component, and continued research on their effectiveness remains an urgent priority.² (Level 1)
- A systematic review examined the effectiveness of respiratory PPE measures, including hand hygiene and surgical face masks in preventing human-to-human influenza transmission during the 2009 A(H1N1)pdm09 pandemic. A significant protective effect was found in the one RCT where a face mask was used, in conjunction with intensified hand hygiene, in households with an infected individual over the age of two years. In a meta-analysis of moderately heterogeneous observational studies a non-significant protective effect in preventing influenza infection was also observed. Although the evidence regarding face mask use was mixed, using face masks in situations with high risk of exposure to influenza infection was effective when used in conjunction with intensified hand hygiene and the intervention was implemented within 36 hours after symptom onset of the index case.³ (Level 1)

- An interim guideline from the World Health Organization (WHO) regarding the use of masks in the community for the protection against respiratory infection (released to provide recommendations specifically regarding the 2019 coronavirus disease [COVID-19]) recommends that:⁴ (Level 5)
 - Wearing a medical/surgical mask may limit the spread of certain respiratory diseases, including COVID-19 when used in conjunction with evidence-based hand hygiene. However, a medical/surgical mask is not required for people who are not sick as there is no evidence to support the use of masks in protecting against acquiring respiratory infection. The WHO advise that wearing these masks in community settings may result in unnecessary costs and other burdens and create a false sense of security.
 - Cloth (e.g. cotton or gauze) masks are not recommended under any circumstances.
 - If a mask is worn to protect others: (1) it must be placed to cover the mouth and nose, and tied securely to minimize any gaps; (2) it should not be touched while wearing or when removing; (3) if inadvertently touching the mask, hands must be immediately cleaned with soap and water, or alcohol based hand rub; (4) replace a mask when it becomes damp and discard single-use masks immediately; and (5) do not re-use a single-use mask.

Characteristics of the Evidence

This evidence summary is based on a structured search of the literature and selected evidence-based health care databases. The evidence in this summary comes from:

- A systematic review (part of a series of four systematic reviews) of 10 RCTs.¹
- A systematic review of 17 studies (8 RCTs – five in community settings and three hospital-based studies, and nine observational studies – seven conducted among healthcare workers and two community-based studies).²
- A systematic review of 16 studies, eight measuring the effectiveness of face mask use (one cluster RCT, three case-control, two cohort, and two cross-sectional), and the remaining measuring the effectiveness of hand hygiene practices only.³
- A WHO interim guideline.⁴

Best Practice Recommendations

- A multifaceted approach (e.g. the use of masks during high risk exposure and the practice of evidence-based hand hygiene techniques) to prevent the transmission of respiratory infection in the community is recommended. (Grade A)
- The wearing of masks or respirators by uninfected persons in the general community are not recommended. (Grade B)
- A mask may be worn by persons at high risk of exposure (e.g. persons living in a household with an infected individual). (Grade B)
- Masks should be changed immediately when they become damp. (Grade B)
- Single use masks should be discarded immediately and never re-used. (Grade B)
- If a mask is worn, it should be placed to cover the mouth and nose and tied securely to minimize any gaps. (Grade B)
- The mask should not be touched while wearing or when removing; if inadvertently touching the mask, hands must be immediately cleaned with soap and water, or alcohol-based hand rub. (Grade B)
- Cloth (e.g. cotton or gauze) masks are not recommended under any circumstances, to prevent the transmission of respiratory infection in low-risk community settings. (Grade B)

References

1. Xiao J, Shiu EYC, Gao H, Wong JY, Fong MW, Ryu S, et al. Nonpharmaceutical measures for pandemic influenza in nonhealthcare settings-personal protective and environmental measures. *Emerg Infect Dis.* 2020; 26(5).
2. Bin-Reza F, Lopez Chavarrias V, Nicoll A, Chamberland ME. The use of masks and respirators to prevent transmission of influenza: a systematic review of the scientific evidence. *Influenza Other Respir Viruses.* 2012; 6(4):257-67.
3. Saunders-Hastings P, Crispo JAG, Sikora L, Krewski D. Effectiveness of personal protective measures in reducing pandemic influenza transmission: a systematic review and meta-analysis. *Epidemics.* 2017; 20:1-20.
4. World Health Organization (WHO). Advice on the use of masks in the community, during home care, and in health care settings in the context of COVID-19: interim guidance. 2020. Accessed 26 March 2020 at <https://apps.who.int/iris/handle/10665/331493>

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For details on the method for development see Munn Z, Lockwood C, Moola S. The development and use of evidence summaries for point of care information systems: A streamlined rapid review approach. *Worldviews Evid Based Nurs.* 2015;12(3):131-8.

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