

Cloth (Fabric) Masks as an Alternative to N95 Respirators in a Health Care Setting: Supplemental Information

Key Messages

This supplemental information was generated to support decision-making and to provide information on cloth (fabric) masks during the novel coronavirus disease (COVID-19) pandemic.

We examined the recommendations from national and international health authorities and organizations and completed a targeted search of published literature. We found the following:

- Only one randomized trial assessed cloth masks in a 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

Background and Context

On April 7, Ontario Health (Quality) received a request from the Ontario Health Secretariat for information around cloth masks during the COVID-19 pandemic. In response to that request, this supplementary information provides a summary of the evidence from Ontario Health’s rapid evidence review (March 31) and from a targeted search for published scientific literature and guidance.

Guidance and Peer-Reviewed Studies

Research Studies

A cluster randomized trial (MacIntyre et al, 2015)¹ evaluated the efficacy of cloth masks (two layers, made of cotton, and washed after shifts) compared with medical masks (three layers, made of nonwoven material) and a control group in hospital health care workers in 14 secondary-level/tertiary-level hospitals (74 wards: emergency, infectious/respiratory disease, intensive care, and pediatrics) in Vietnam. Examining the outcomes of clinical respiratory illness, influenza-like illness, and laboratory-confirmed respiratory infection (rhinoviruses, human metapneumovirus [hMPV], influenza B), the study found the following:

- The rates of all infection outcomes were highest in the cloth mask arm compared with the medical mask arm
- The rate of influenza-like illness was significantly higher in the cloth mask arm (relative risk [RR] 13.00, 95% confidence interval [CI] 1.69–100.07) compared with the medical mask arm
- Rates of laboratory-confirmed respiratory virus infection were significantly higher in the cloth mask arm (RR 1.72, 95% CI 1.01–2.94) compared with the medical mask arm
- Penetration of cloth masks by particles was almost 97% and of medical masks was approximately 44%

The authors concluded that their results caution against the use of cloth masks, stating that moisture retention, reuse of cloth masks, and poor filtration may result in increased risk of infection. They asserted that, as a precautionary measure, cloth masks should not be recommended for health care workers, particularly in high-risk situations.

It is worth noting that this study did not compare the use of cloth masks to N95 respirators (only 1% of health care workers in the study reported using an N95 respirator) and was not performed during the current COVID-19 pandemic.

In an updated comment on the study above, MacIntyre (2020)² stated that “there have been a number of laboratory studies looking at the effectiveness of different types of cloth materials, single versus multiple layers and about the role that filters can play. However, none have been tested in a clinical trial for efficacy.” They also advised health care workers who choose to wear cloth masks to “have at least two and cycle them, so that each one can be washed and dried after daily use. Sanitizer spray or UV disinfection boxes can be used to clean them during breaks in a single day. These are pragmatic, rather than evidence-based suggestions, given the situation.”

Chughtai et al (2013)³ conducted a literature review on the use of cloth masks in the health care setting. They did not find any published research on the efficacy of cloth masks, or any guidelines that

recommended the use of cloth masks for protection against respiratory virus transmission. Studies showed that some cloths may provide better protection than others (e.g., fine muslin was better than gauze, gauze padded with cotton was better than simple gauze or paper masks, and towels were more effective than other cloths), and filtration capacity improves with increasing fineness of cloth and number of layers.

MacIntyre et al (2015)⁴ conducted a literature review on face masks for the prevention of infection in health care and community settings and stated that data on the use of cloth masks for the prevention of diphtheria, measles, and tuberculosis are limited and outdated. The authors cite guidance from the Centers for Disease Control and Prevention (CDC), the World Health Organization (WHO), and the Institute of Medicine, which recommend that in high-risk health care settings, health care workers caring for patients with seasonal influenza, pandemic influenza, Middle East respiratory syndrome coronavirus (MERS-CoV), or Ebola virus, should use cloth masks as only the last choice.

Guidance

The WHO (2020)⁵, the European Centre for Disease Prevention and Control (2020)⁶, and the CDC (2020)⁷ also advise that based on the first study cited above (MacIntyre et al, 2015)⁸, cotton cloth masks should not be considered appropriate for health care workers and should be considered a last-resort interim solution until availability of standard personal protective equipment is restored.

While the CDC (2020)⁹ suggests cloth masks for only the general public, they recommend using tightly woven cotton cloth, such as quilting cloth, cotton sheets, and T-shirt cloth. They provide instructions on how to make masks with or without sewing, including using a bandana and coffee filter to create a face covering.

References

¹ MacIntyre CR, Seale H, Dung TC, Hien NT, Nga PT, Chughtai AA, et al. A cluster randomised trial of cloth masks in healthcare workers. *BMJ Open*. 2015;5:e006577

² MacIntyre CR. A cluster randomised trial of cloth masks compared with medical masks in healthcare workers [response]. *BMJ Open* 2020;30. <https://bmjopen.bmj.com/content/5/4/e006577.responses#COVID-19-shortages-of-masks-and-the-use-of-cloth-masks-as-alast-resort.25903751>

³ Chughtai AA, Seale H, MacIntyre CR. Use of cloth masks in the practice of infection control—evidence and policy gaps. *Int J Infect Control* [Internet]. 2013 [cited 2020 Apr 7];9(3). Available from: <https://www.ijic.info/article/view/11366>

⁴ MacIntyre CR, Chughtai AA. Facemasks for the prevention of infection in healthcare and community settings. *BMJ*. 2015; 350:h694

⁵ World Health Organization. Advice on the use of masks in the context of COVID-19 [Internet]. Geneva (Switzerland): 2020 Apr 6 [cited 2020 Apr 7]. [https://www.who.int/publications-detail/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-\(2019-ncov\)-outbreak](https://www.who.int/publications-detail/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-(2019-ncov)-outbreak)

⁶ European Centre for Disease Prevention and Control. Cloth masks and mask sterilisation as options in case of shortage of surgical masks and respirators [Internet]. Stockholm (SE): 2020 Mar 26 [cited 2020 Apr 7]. <https://www.ecdc.europa.eu/sites/default/files/documents/Cloth-face-masks-in-case-shortage-surgical-masks-respirators2020-03-26.pdf>

⁷ US Centers for Disease Control and Prevention. Strategies for optimizing the supply of facemasks [Internet]. Atlanta (GA): 2020 Mar 17 [cited 2020 Apr 7]. <https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/face-masks.html>

⁸ MacIntyre CR, Seale H, Dung TC, Hien NT, Nga PT, Chughtai AA, et al. A cluster randomised trial of cloth masks in healthcare workers. *BMJ Open*. 2015;5:e006577

⁹ US Centers for Disease Control and Prevention. Use of cloth face coverings to help slow the spread of COVID-19 [Internet]. Atlanta (GA): 2020 Apr 4 [cited 2020 Apr 7]. <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/diy-cloth-face-coverings.html>

