Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Proposed approach for reusing surgical masks in COVID-19 pandemic

To the Editor: Coronavirus disease 2019 (COVID-19) is a novel human respiratory disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus. Washing hands and social distancing are measures recommended by the Centers for Disease Control and Prevention to prevent COVID-19 transmission. However, new evidence shows that the half-life of viable SARS-CoV-2 in aerosol is longer than 1 hour, indicating a high likelihood of airborne transmission. Furthermore, the existence of an asymptomatic carrier phase decreases the effectiveness of prevention strategies that rely on symptoms.

There is a strong rationale for a universal mask policy. Wearing a face mask will not only prevent airborne viral transmission but also reduce the likelihood of one’s hands touching the mouth and nose. It is particularly needed to prevent the transmission from asymptomatic medical professionals to patients and colleagues. Owing to the current shortage of masks, it is prudent to conserve masks whenever possible. More than 100 billion masks will be needed for 300 million Americans annually if 1 person uses 1 mask per day. This is far beyond the current capacity of United States face mask manufacturing.

Although the United States Food and Drug Administration has approved mask decontamination by H2O2 vapor, it requires special equipment that limits its widespread application. A simple, effective decontamination method that does not disrupt filtration efficacy of the mask is needed.

Decontamination of masks is challenging because the filtration capacity of polypropylene is vulnerable to most commonly used sterilization methods, including autoclaving, bleach, and alcohol. The filtration layer of masks is made of melt-blown polypropylene that determines the pore size of a face mask. An analysis of 5 different decontamination methods identified dry heat as a preferred method. Although the dry heat approach did not significantly change the filtration efficiency of melt-blown polypropylene, it forms crystals at higher temperatures. The accumulation of the crystals will ultimately compromise the filtration efficiency.

On the basis of the low crystallinity of polypropylene at 70°C and data demonstrating that coronavirus can be effectively inactivated at 65°C for 30 minutes, dry heat at 65°C to 70°C for 30 min should be an effective condition to decontaminate used masks. It has been demonstrated that the filtration efficiency of a face mask is not significantly changed after up to 20 cycles of decontamination with hot air (75°C) for 30 minutes in each cycle.

Heating at 65° to 70°C can be achieved by baking in an oven, incubator, or even a blanket warmer. Although the efficiency of a mask treated under these conditions remains to be determined, this method provides a simple, straightforward, and effective strategy for decontamination of used masks. The general guideline for reuse of face masks includes:

1. Masks contaminated with fluids should not be reused, due to the compromise of filtration efficiency.
2. When sanitizing with heat, place the mask in a brown paper bag, with your name on it, to avoid direct contact with the metal surface or other masks.
3. The 0.3- to 10-μm pore size of standard surgical face masks is much larger than the coronavirus (0.1 μm) and incompletely form-fits the face. Therefore, surgical masks should not be used when in contact with patients that are potentially positive for COVID-19.

Yuangang Liu, PhD, Sancy A. Leachman, MD, PhD, and Anna Bar, MD

From the Department of Dermatology, Oregon Health & Science University, Portland, Oregon.

Funding sources: None.

Conflicts of interest: None disclosed.

IRB approval status: Not applicable.

Reprints not available from the authors.

Correspondence to: Yuangang Liu, PhD, Department of Dermatology, L468R, Oregon Health & Science University, Portland, OR 97239.

E-mail: liuy@ohsu.edu

Correspondence to: Anna Bar, MD, Department of Dermatology, Oregon Health & Science University, Portland, OR 97239

E-mail: bara@ohsu.edu

REFERENCES
1. van Doremalen N, Morris DH, Gamble A, et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. N Engl J Med. 2020;382:1564-1567.
2. Lin TH, Chen CC, Huang SH, Kuo CW, Lai CY, Lin WY. Filter quality of electret masks in filtering 14.6-594 nm aerosol particles: effects of five decontamination methods. PloS One. 2017;12:e0186217.
3. Cheng S, Muhaminul ASM, Yue Z, et al. Effect of temperature on the structure and filtration performance of polypropylene melt-blown nonwovens. AUTEX Res J. 2020. https://doi.org/10.2478/aut-2019-0067.
4. Kariwa H, Fujii N, Takashima I. Inactivation of SARS coronavirus by means of povidone-iodine, physical conditions and chemical reagents. Dermatology. 2006;212(Suppl 1):119-123.

5. Price A, Chu LF. Addressing COVID-19 Face Mask Shortages. March 25, 2020. Learnly Anesthesia/Stanford AIM Lab COVID-19 Evidence Service. Available at: https://stanfordmedicine.app.box.com/v/covid19-PPE-1-2. Accessed April 7, 2020.

https://doi.org/10.1016/j.jaad.2020.04.099