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.

commission portal, users can search for alerted products, seeing pictures, characteristics and if measures were ordered by public authorities. It is also provided a list of contacts to make a report to national authorities.[7]

To date, the risk of infection associated with the use of counterfeit FFR has not been estimated since no specific data are available. However, it is reasonable to believe that counterfeit FFR pose an additional risk of contagion to health care workers due the potentially lower protecting capacity. An analysis conducted by the US National Personal Protective Technology Laboratory demonstrated that the filtering capacity of not NIOSH-approved FFR can vary considerably, from 24.1% to equal to the standard (minimum level >95% for N95 type).[8]

Health care workers should alert local competent authorities when in doubt about the appropriateness of FFR in use. Should health care workers' safety rely on the individual ability to detect counterfeit FFR before using? Are institutions making all the possible efforts to avoid making these products available to health care workers?

Countermeasures are urgently needed at both government and institutional levels. Informative campaigns to increase awareness, formal training on how to recognize counterfeit FFR and rigid quality standard check before the distribution to health care setting can help limiting the risk associated with this phenomenon.

The table briefly provides the characteristics of legitimate FFR in comparison with potentially counterfeit ones that can be used as warnings signs for the user. Information were retrieved from CDC.[5,6]

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Mariachiara Ippolito, MD
Cesare Gregoretti, MD
Andrea Cortegiani, MD*
Department of Surgical, Oncological and Oral Science (Di.Chir.On.S.), Section of Anaesthesia, Analgesia, Intensive Care and Emergency, Policlinico Paolo Giaccone, University of Palermo, Palermo, Italy

Pasquale Iozzo, MD
Department of Anesthesia and Intensive Care, Policlinico Paolo Giaccone, University of Palermo, Palermo, Italy

* Address correspondence to Andrea Cortegiani, Department of Surgical, Oncological and Oral Science (Di.Chir.On.S), Section of Anaesthesia, Analgesia, Intensive Care and Emergency, Policlinico Paolo Giaccone. University of Palermo, Palermo, Italy
E-mail address: andrea.cortegiani@unipa.it (A. Cortegiani).

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It's not the heat, it's the humidity: Effectiveness of a rice cooker-steamer for decontamination of cloth and surgical face masks and N95 respirators

To the Editor

In the setting of the coronavirus disease 2019 pandemic, healthcare facilities have been forced to adopt strategies to extend or reuse personal protective equipment (PPE) such as N95 filtering facepiece respirators and surgical face masks.[1] Cloth face masks worn in public settings where social distancing cannot be maintained are also typically reused multiple times between laundering. A variety of strategies for decontamination of PPE are under investigation, including use of ultraviolet light and hydrogen peroxide vapor.[2] However, sending used respirators to a central processing facility for hydrogen peroxide vapor treatment is likely to be labor-intensive and costly and ultraviolet light is suboptimal for decontamination of soft surfaces.[3] There is an urgent need for simple and widely available methods to decontaminate PPE, including cloth masks.

One potential method to decontaminate face masks and respirators is moist or dry heat.[3] Previous reports suggest that moist heat at 65°C for 20 minutes is effective against viruses such as influenza.[3,4] In Taiwan, 1 common practice used for decontamination of cloth face masks is using a short cycle of treatment in a rice cooker or other kitchen steamer. This method has the advantage of being widely available and easy to use, particularly for cloth face masks. Therefore, we evaluated the efficacy of steam treatment applied via a rice cooker-steamer vs similar levels of dry heat for decontamination of cloth and surgical face masks and N95 respirators.

We studied surgical face masks (Precept; Arden, NC), 3M 1860 N95 respirators (3M; Saint Paul, MN), and cotton and quilting fabric cloth face masks being distributed to visitors and personnel not involved in direct patient care at a Cleveland area hospital. The test organisms included a clinical isolate of methicillin-resistant *Staphylococcus aureus* and the nonenveloped, single-stranded RNA virus bacteriophage MS2 which was prepared as previously described.[3] The test protocol has been reported previously.[3] In brief, 10-μL aliquots containing 10^6 colony-forming units or plaque-forming units of the test organisms suspended in 8% simulated mucus were inoculated onto 1-cm^2 areas on both the outer or inner surfaces of the respirators or face masks.[3] The inoculated masks or respirators were subjected to a cycle of treatment in a steamer (Aroma; San Diego, CA) lasting approximately 13-15 minutes, including 8-10 minutes of heating and 5 minutes of steam. For comparison, inoculated masks or respirators were subjected to dry heat at 100°C for 15 minutes in an oven (Thermo Fisher Scientific; Waltham, MA). After treatment, the

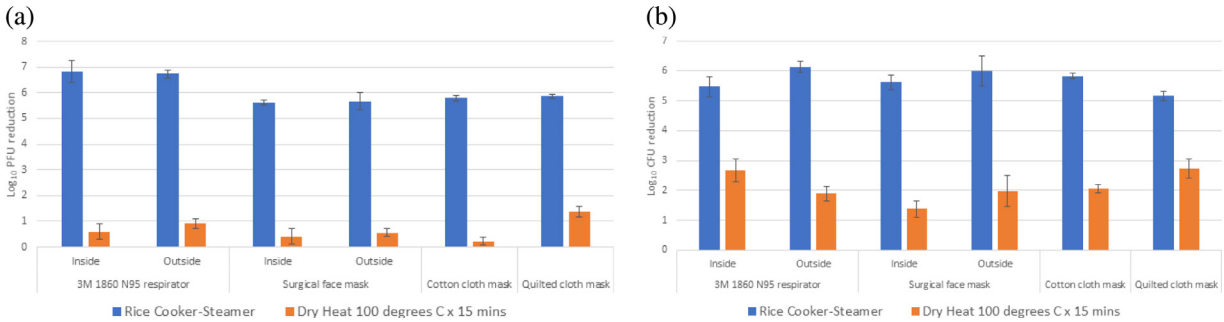

Fig 1. Efficacy of treatment in a rice cooker-steamer including 8-10 minutes of heating and 5 minutes of steam vs dry heat at 100°C for 15 minutes in an oven for decontamination of methicillin-resistant *Staphylococcus aureus* (MRSA) and bacteriophage MS2 on 3M 1860 N95 respirators, surgical face masks, and cotton and quilting fabric cloth face masks. 10-μL aliquots containing 10^6 colony-forming units (CFU) or plaque-forming units (PFU) of the test organisms in the simulated mucus suspension were spread to cover an area of 1-cm^2 on inner and outer surfaces of the N95 respirators and surgical face masks and on 1 surface of the cloth masks. Error bars indicate standard error.

inoculated sections of the face masks and N95 respirators were vortexed for 1 minute in 1 mL of phosphate-buffered saline with 0.02% Tween and serial dilutions were plated on selective media to quantify viable organisms.[3] All tests were performed in triplicate. Log_{10} reductions were calculated in comparison to untreated controls. A reduction of 3-log10 or greater in recovery of organisms inoculated onto masks or respirators was considered effective for decontamination.[3]

As shown in Figure 1, the steam treatment resulted in a greater than 5 log_{10} reduction in bacteriophage MS2 and methicillin-resistant *S aureus* applied to the outer and inner surfaces of the face masks and respirators, whereas dry heat at 100°C for 15 minutes did not result in a greater than 3 log_{10} reduction of either organism at any of the inoculated sites on any masks or respirators. No visible changes were observed in any of the masks or respirators after 5 cycles of decontamination.

Our results demonstrate that a short cycle of steam treatment applied via a commonly used kitchen rice cooker-steamer can be very effective for decontamination of face masks and N95 respirators. Dry heat at the same temperature levels was much less effective, consistent with previous evidence that moist heat or microwave-generated steam is more effective than dry heat for inactivation of viruses.[4,5] Notably, the short cycle of steam treatment was substantially more effective than ultraviolet light treatment for N95 decontamination and nearly as effective as aerosolized peracetic acid and hydrogen peroxide.[3]

The major limitation of our study is that we did not examine the effect of treatment on respirator or face mask performance. However, there is some evidence that short cycles of steam treatment may have minimal effect on filtration and fit performance.[2] Further testing is needed to evaluate the impact of steam treatment on performance of N95 respirators and surgical face masks.

In summary, our results demonstrate that steam treatment using a rice cooker-steamer is effective for decontamination of face masks and N95 respirators. Given the recommendation that cloth face masks be worn in public settings, steam treatment using these readily available kitchen items could provide safe and effective decontamination of cloth masks. Further studies are needed to evaluate steam treatment for N95 respirators and surgical face masks. Investigations of moist heat are also needed as 20 minutes of exposure to moist heat at 65°C has been reported to be effective with minimal adverse effects on respirator performance.[3,4]

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Daniel F. Li, BS
Jennifer L. Cadnum, BS
Research Service, Louis Stokes Cleveland VA Medical Center, Cleveland, OH

Sarah N. Redmond, BS
Case Western Reserve University School of Medicine, Cleveland, OH

Lucas D. Jones, BS
Department of Molecular Biology and Microbiology, Case Western Reserve University School of Medicine, Cleveland OH

Curtis J. Donskey, MD*
Geriatric Research, Education, and Clinical Center, Louis Stokes Cleveland VA Medical Center, Cleveland, OH

* Address correspondence to Curtis J. Donskey, MD, Geriatric Research, Education, and Clinical Center 1110W, Louis Stokes Cleveland VA Medical Center, 10701 East Boulevard, Cleveland, OH 44106.

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Steam treatment for rapid decontamination of N95 respirators and medical face masks

To the Editor:

Decontamination and reuse of personal protective equipment such as N95 respirators is not recommended but may be considered