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Reuse and Decontamination of N95 Respirators in Dentistry

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• **Conflicts of interest: none declared.**

Dear Editor,

Three months since the COVID-19 pandemic reached Brazil, many health institutions are facing a shortage of N95/FFP2 (FFP - Filtering Facepiece) or similar respirators. The US Centers for Disease Control and Prevention (CDC) has published a number of strategies for optimizing the supply of these respirators, including the possibility of their reuse without decontamination.[1] I would like to discuss some of the drawbacks of such practice in the dental care setting.

One of the main concerns about reuse without decontamination is the possibility of contact transmission when the user touches the outside of the respirator.[2,3,4] Risks associated with reuse could be reduced by placing protective barriers over the respirator, cleaning hands before and after handling the respirator, wearing gloves when adjusting the reused respirator, and leaving it for five days before reuse.[2,3,6,7] This five-day wait is based on studies of the persistence of SARS-CoV-2 on different surfaces.[8]

Nonetheless, reusing the same respirator without decontamination after leaving it for a period of time fails to take account of the lack of scientific evidence on the survival time of SARS-CoV-2 in respirators, nor does it take into account potential contamination by other pathogens, such as the influenza A virus (H1N1) = (influenza A virus subtype H1N1 (A/H1N1)), which can persist in respirators for up to six days.[9] Finally, dental care is inherently high-risk because it involves aerosol-generating procedures, after which respirator disposal is recommended.[2,3,6]

Several methods for decontaminating respirators are being tested. Although some studies have shown promising results, there are no regulations in Brazil for this.[10] The only decontamination method approved by the US Food and Drug Administration (FDA) for emergency and exceptional circumstances is vaporized hydrogen peroxide.[11] Table 1 presents the decontamination methods, their approval (or not) for emergency use by the FDA, and the manufacturer's evaluation. [12]

Table 1. Methods for the decontamination of N95* respirators, whether approved for emergency use by the Food and Drug Administration (USA), and manufacturer's evaluation.

Decontamination Method	Authorized or not for Emergency Use** (FDA - USA)	Manufacturer's Evaluation13
Vaporized hydrogen peroxide	Yes	Filtration efficiency and seal quality approved after 10 treatment cycles
Low-temperature moist heat	No	Filtration efficiency and seal quality approved after 10 treatment cycles
Ultraviolet germicidal irradiation	No	Filtration efficiency and seal quality approved after 10 treatment cycles
Ethylene oxide	No	Not recommended due to the risk of residual toxicity from ethylene oxide (carcinogen)
Ionizing radiation	No	Not recommended because it may impair the performance of the filter
Microwaves	No	Not recommended due to risk of respirator melting near metal components, compromising the seal
Moist heat at over 75°C	No	Not recommended because it may cause degradation of the filter
Ethanol	No	Not recommended because it may impair the performance of the filter

*N95 respirators - National Institute for Occupational Safety and Health (NIOSH).
**To date, Brazil has not passed any regulations on the use of methods for the decontamination of respirators.

Several decontamination studies fail to evaluate the survival of other pathogens that may contaminate respirators and also fail to evaluate the effect of the decontamination processes on their fit, seal and filter performance.[12] Also, the studies do not include respirators that have been exposed to aerosol-generating procedures, which limits the applicability of this practice to respirators used in dentistry.

In times of serious supply shortages, the adoption of strategies such as the extended use and reuse of respirators are alternatives that could be recommended for optimizing stocks. The decision as to whether to permit the extended use and reuse of respirators is the responsibility of infection control committees at the institutions in question in consultation with disease/infection control agencies and public health authorities.

Clinical studies on the extended use and reuse of respirators are subject to ethical restrictions, since its recommendation is limited to exceptional situations of a limited duration during periods of crisis. In dental care, extended use, always in combination with a barrier (face shield) to reduce contamination of the respirator surface, is preferable to reuse.

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Mini Curriculum and Author's Contribution

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