

Personal Protective Equipment

Decontamination and Reuse of Filtering Facepiece Respirators

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Disposable filtering facepiece respirators (FFRs) are not approved for routine decontamination and reuse as standard of care. However, FFR decontamination and reuse may need to be considered as a crisis capacity strategy to ensure continued availability. Based on the limited research available, ultraviolet germicidal irradiation, vaporous hydrogen peroxide, and moist heat showed the most promise as potential methods to decontaminate FFRs. This document summarizes research about decontamination of FFRs before reuse.

Introduction

Reusing disposable filtering facepiece respirators (FFRs) has been suggested as a contingency capacity strategy to conserve available supplies for healthcare environments during a pandemic. Strategies for FFR extended use and reuse (without decontamination of the respirator) are currently available from *CDC's National Institute for Occupational Safety and Health (NIOSH)*.

The surfaces of an FFR may become contaminated while filtering the inhalation air of the wearer during exposures to pathogen-laden aerosols. The pathogens on the filter materials of the FFR may be transferred to the wearer upon contact with the FFR during activities such as adjusting the FFR, improper doffing of the FFR, or when performing a user-seal check when redoffing a previously worn FFR. A study evaluating the persistence of SARS-CoV-2 (the virus that causes COVID-19) on plastic, stainless steel, and cardboard surfaces showed that the virus is able to survive for up to 72-hours¹. One strategy to mitigate the contact transfer of pathogens from the FFR to the wearer during reuse is to issue five respirators to each healthcare worker who may care for patients with suspected or confirmed COVID-19. The healthcare worker will wear one respirator each day and store it in a breathable paper bag at the end of each shift. The order of FFR use should be repeated with a minimum of five days between each FFR use. This will result in each worker requiring a minimum of five FFRs, providing that they put on, take off, care for them, and store them properly each day. Healthcare workers should treat the FFRs as though they are still contaminated and follow the precautions outlined in the CDC's reuse recommendations. If supplies are even more constrained and five respirators are not available for each worker who needs them, FFR decontamination may be necessary.

Decontamination and subsequent reuse of FFRs should only be practiced as a crisis capacity strategy. At present, FFRs are considered one-time use and there are no manufacturer authorized methods for FFR decontamination prior to reuse. On March 28, 2020, FDA issued an ***Emergency Use Authorization (EUA) permitting the Battelle Decontamination System*** at Battelle Memorial Institute to be authorized for use in decontaminating "compatible N95 respirators." The ***FDA website*** should be checked to determine if other EUAs have been issued since the posting of this crisis capacity strategy guidance. Only respirator manufacturers can reliably provide guidance on how to decontaminate their specific models of FFRs. In absence of manufacturer's recommendations, third parties may also provide guidance or procedures on how to decontaminate respirators without impacting respirator performance. Decontamination might cause poorer fit, filtration efficiency, and breathability of disposable FFRs as a result of changes to the filtering material, straps, nose bridge material, or strap attachments of the FFR. **CDC and NIOSH do not recommend that FFRs be decontaminated and then reused as standard care. This practice would be inconsistent with their approved use, but we**

understand in times of crisis, this option may need to be considered when FFR shortages exist.

An effective FFR decontamination method should reduce the pathogen burden, maintain the function of the FFR, and present no residual chemical hazard. The filter media in NIOSH-approved respirators varies by manufacturer. The ability of the respirator filter media to withstand cleaning and disinfection are not NIOSH performance requirements. The NIOSH's National Personal Protective Technology Laboratory (NPPTL) and other researchers have investigated the impact of various decontamination methods on filtration efficiency, facepiece fit of FFRs, and the ability to reduce viable virus or bacteria on the FFRs. This research is summarized below.

Crisis Standards of Care Decontamination Recommendations

Because ultraviolet germicidal irradiation (UVGI), vaporous hydrogen peroxide (VHP), and moist heat showed the most promise as potential methods to decontaminate FFRs, researchers, decontamination companies, healthcare systems, or individual hospitals should focus current efforts on these technologies. Specifically, the effectiveness of using these methods should be explored further with specific FFR models based on the manufacturers' support to better understand the impact on the respirator performance, including filtration and fit. The respirator manufacturer should be consulted about the impact of the method on their respirators prior to considering the use of any method.

When information from the manufacturer or a third-party is available showing that respirators can be successfully decontaminated without impacting respirator performance, then FFRs decontaminated following those recommendations can be worn for any patient care activities.

In the absence of guidance or when information is available that a respirator cannot be decontaminated without negatively impacting the performance, respirators may still be decontaminated. However, given the uncertainties on the impact of decontamination on respirator performance, these FFRs should not be worn by HCPs when performing or present for an aerosol-generating procedure.

No current data exists supporting the effectiveness of these decontamination methods specifically against SARS-CoV-2 on an FFR. Other pathogens may also be present on FFRs and there is only limited data available for other pathogens. Further work is needed to assure SARS-CoV-2 and other pathogens are inactivated. Therefore, even after decontamination, these FFRs should be handled carefully.

HCPs should take the following precautionary measures prior to using a decontaminated FFR:

- Clean hands with soap and water or an alcohol-based hand sanitizer before and after touching or adjusting the FFR.
- Avoid touching the inside of the FFR.
- Use a pair of clean (non-sterile) gloves when donning and performing a user seal check.
- Visually inspect the FFR to determine if its integrity has been compromised.
- Check that components such as the straps, nose bridge, and nose foam material did not degrade, which can affect the quality of the fit, and seal.
- If the integrity of any part of the FFR is compromised, or if a successful **user seal check** cannot be performed, discard the FFR and try another FFR.
- Users should perform a **user seal check** immediately after they don each FFR and should not use an FFR on which they cannot perform a successful user seal check.

¹van Doremalen, N., et al., *Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1*. *J New England Journal of Medicine*, 2020.

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