

## **Filtering Facepiece Respirators and Viable Microbial Aerosols**

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**ABSTRACT:** The threat of pandemic influenza has raised concerns over the effectiveness and availability of filtering facepiece respirators (FFRs), as realized during the 2009 H1N1 pandemic when FFR shortages occurred. Over the past six years, we conducted diverse research aimed at better understanding FFR performance and collected data that can be used for advanced development of FFRs: 1) It was demonstrated that FFRs can be decontaminated of H1N1 and H5N1 (> 4-log reduction) using simple and inexpensive decontamination technologies (microwave, low-temperature oven, ultraviolet light) without significant decay in performance or fit; 2) FFRs were evaluated to determine if they can be cleaned using simple wipe products. The data demonstrated that FFR cleaning is difficult, but also identified some materials that were more compatible than others; 3) Bacterial contamination found on FFRs in hospital settings was evaluated by analyzing FFRs worn by environmental staff when cleaning discharged patient rooms. The mean bacterial load was  $2.7 \times 10^3$  CFU per FFR and >97% of the microbes were found on the external layer; and 4) FFR performance when challenged with viable influenza was evaluated and it was determined that FFRs remove influenza as effectively as inert particles of the same size. Additionally, total inward leakage of FFRs will also be evaluated using an articulated mannequin challenged with influenza. This research and the resulting data provide insight into specifications for the next generation of respiratory protection devices and provide solutions for short-term mitigation of an FFR shortage caused by pandemic influenza.