

Transfer of Influenza from Contaminated Filtering Facepiece Respirators to the Hands of Healthcare Workers

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Filtering facepiece respirators (FFRs) may serve as fomites allowing viruses to be transferred to the hands of healthcare workers (HCWs) during donning, doffing, or handling, creating the potential for self-inoculation. Once on the hands, the viruses could also be spread to patients, other HCWs, and the environment. The fomite potential of FFRs is always a concern when devising strategies to maintain FFR supplies in hospitals during periods of high demand and was recently considered in design recommendations for a healthcare specific B-95 FFR. However, the risk associated with touching a contaminated FFR is unknown as field studies are lacking. A mathematical model was developed to estimate FFR contamination as a function of airborne influenza concentration reported in hospitals and typical HCW respirator use conditions (e.g., ventilation rate, length of respirator use, etc.). The model was validated in the laboratory by exposing facemasks mounted on breathing headforms to various concentrations of aerosolized influenza in a simulated healthcare room and demonstrated significant correlation ($R^2=0.93$) with the laboratory results. The fomite risk of FFRs was estimated using outputs of this model and data from a study which measured the transfer of *Bacillus atrophaeus* from an FFR to synthetic skin. The estimated FFR contamination expected in a healthcare setting was 3000 viruses for an FFR used for 15 minutes. The measured transfer of bacteria on FFRs to synthetic skin was not substantial ($\approx 0.1\%$). Given these assumptions, it is estimated that virus transfer to the fingertips of HCWs from contaminated FFRs is unlikely.

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