

Assessing real-time performances of N95 respirators for health care workers by simulated workplace protection factors

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Health care workers (HCW) are often exposed to patient-generated aerosols so as to be in danger of contracting infectious diseases, including SARS, influenza, and tuberculosis, etc. Many HCWs rely on respirators as a primary defense. The purpose of this study was to assess real-time performances of N95 respirators for HCWs in a simulated health setting.

We measured the simulated workplace protection factors (SWPF) in real-time from the volunteers. A total of 35 study subjects, wearing 3M Model N95 1860 and 1860S, were fit tested using the OSHA exercise regimen. Their facial dimensions were matched to the Los Alamos National Laboratory (LANL) test panel. The subjects were asked to perform simulated health care scenarios, including patient assessment activities, suction, and IV treatment. Two particle measuring instruments, a TSI Portacount Pro+ 8038 and an N95-Companion TSI Portacount Plus Model 8020, continuously measure concentrations inside and outside the respirator, side-by-side.

All but one of 35 subjects were included in the LANL test panel. For QNFTs, 22 of 34 (64.7%) passed the fit factor (FF) criteria set at 100 and 12(35.3%) failed. The results of QNFT were found to have a low correlation with SWPF, with $r^2=0.38$. SWPFs were 72.3 ± 13.2 (mean \pm SD) for those subjects who passed FF, while they were 46.0 ± 11.7 for those who failed. Lower SWPFs were measured while performing the following activities; moving head up and down, and bending at the waist (e.g. raising and/or lowering the stretcher rails). This study identifies the needs for providing different sizes of respirators for HCWs, the importance of performing FFs for HCWs, regularly, and

particular activities, such as bending at the waist and moving head up and down, that could affect more on SWPFs.