

Performance of Facepiece Respirators and Masks against Surgical Smoke: SWPF Study

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Healthcare workers in operating rooms are often exposed to surgical smoke when surgical and invasive procedures are performed by using laser or other devices that interact with tissue. Potentially infectious viruses, bacteria, and hazardous chemicals are found in surgical smoke, which are associated with several respiratory diseases including chronic cough, throat irritation, and asthma. Additionally, surgical smoke is represented mostly by the ultrafine fraction, which is of particular health concern. To control the exposure, the healthcare workers wear surgical masks or filtering facepiece respirators (FFRs). Surgical masks have been demonstrated to be inefficient to protect wearers from airborne particles. FFRs have not been extensively tested against surgical smoke. In this study, we propose to conduct a study to investigate the Simulated Workplace Protection Factor of two N95 FFRs and two surgical masks against surgical smoke. First, a subject will be fit-tested with a facepiece under the test (only N95 FFRs can be fit-tested). If passed, the subject will be studied in the exposure chamber while wearing the tested respiratory protection device and applying an electrocautery unit to the tissue mimicking a conventional surgical procedure. The particle concentration inside (C_{in}) and outside (C_{out}) of the respirator will be measured by a P-Trak condensation particle counter and a Nanocheck particle spectrometer operating in parallel. The SWPF values will be determined as the ratio of C_{out}/C_{in} . The effects of different type of respiratory protection device will be quantified. The particle size will be evaluated as a factor affecting the SWPF. The results will help establish a better understanding of the respirator performance against surgical smoke and will provide scientific data for respirator manufacturers focusing on designing better respirator against surgical smoke.

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