

Abstract Submitted
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Simulation of a Vacuum Helmet to Contain Pathogen-Bearing Droplets in Dental, Otolaryngologic, and Ophthalmologic Outpatient Interventions DONGJIE JIA, Cornell University, JONATHAN LEE BAKER, PHD, ANAIS RAMEAU, MD, MPIL, Weill Cornell Medicine, MAHDI ESMAILY, Cornell University — Clinic encounters of dentists, otolaryngologists, and ophthalmologists inherently expose these specialists to an enhanced risk of SARS-CoV-2 infection, thus threatening them, their patients, and their practices. In this study, we propose and simulate a vacuum helmet used on patients to minimize transmission risk by containing droplets created through coughing. The helmet has an accessible face opening and a connected suction device to prevent droplets from exiting through the face opening and contaminating the environment or clinical practitioners. We used CFD in conjunction with point-particle tracking to simulate droplet trajectories when a patient coughs while using this device. A wide range of particle diameters and unsteady flow conditions are considered in the simulations. The effectiveness of the proposed design in containing droplets is demonstrated.

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