

Abstract Submitted  
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**Clinical questions and the role CFD can play**<sup>1</sup> SAIKAT BASU, PHD, JULIA S. KIMBELL, PHD, ADAM M. ZANATION, MD, CHARLES S. EBERT, MD, BRENT A. SENIOR, MD, School of Medicine, UNC Chapel Hill — Use of computational fluid dynamics has revolutionized our perspectives on flow problems in engineering. These tools are however still underused in exploring clinical questions. Here we present some representative CFD-based findings that can improve current clinical practice. Chronic rhinosinusitis (CRS) is a complex inflammatory disease affecting over 11 million Americans yearly. It obstructs sinus pathways, thus hindering ventilation and clearance. Prescribed topical medications are often ineffective even after surgeries, partially owing to scanty drug delivery to the affected areas. We focus on improving the use of the most frequently used topical nasal sprays. From computed tomography (CT) scans, we develop 3D sinonasal airway models on the medical imaging software Mimics<sup>TM</sup>, which are then meshed using ICEM-CFD<sup>TM</sup> followed by airflow and particle simulations on Fluent<sup>TM</sup> (v.14.5, ANSYS, Inc.). The results quantify aerosol particle delivery to target cavities before and after surgical alleviation. Various combinations of breathing techniques and head-nozzle orientations can increase target-site particle deposition over depositions using prevalent physician recommendations, and our findings facilitate identification of such optimal conditions.

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Saikat Basu  
Univ of NC - Chapel Hill

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