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Numerical investigation of the role of air ventilation rate in reducing healthcare worker exposure to infectious aerosols in a hospital isolation room ANTHONY PEREZ, JUAN PENALOZA-GUTIERREZ, ANDRES TEJADA-MARTINEZ, Univ of South Florida — Aerosol dispersion from a coughing patient in a hospital isolation room is investigated via Reynolds-averaged Navier-Stokes simulation (RANSS). Dispersion in the room is caused by the air circulation driven by the room's ventilation. Healthcare worker (HCW) exposure to the aerosol contaminant will be assessed through residence time analysis of the imperfect mixing induced by inflow-outflow channeling (i.e. flow channeling between the supply and exhaust air vents) and dead zone regions in the room. It is observed that dead zones can trap aerosols over periods of time comparable to or greater than the theoretical residence time of the room (approximately 10 mins. for typical isolation rooms). Furthermore, increasing the ACH leads to more efficient mixing by weakening dead zones resulting in lower amounts of trapped contaminant. HCW exposure to aerosol contaminant will be quantified as a function of ACH. Finally, the RANSS results will be used to calibrate a less computationally intensive zonal compartment model able to predict average aerosol concentration throughout the room as well as HCW exposure to the infectious aerosols.

Anthony Perez
Univ of South Florida

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