Update using industry data on modeling SARS-CoV-2 exposure reduction through physically distanced seating patterns and masking in aircraft cabins

James Bennett[1], Seif Mahmoud[2], Watts L. Dietrich[2], Byron W. Jones[3], and Mohammad Hosni[3]

[1]Centers for Disease Control and Prevention
[2]National Institute for Occupational Safety and Health
[3]Kansas State University Alan Levin Department of Mechanical and Nuclear Engineering

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Abstract

Aircraft cabins have high-performance ventilation systems, yet typically hold large numbers of people in close proximity for long periods. The current study estimated airborne virus exposure and infection reductions for vacant middle seats and masking in aircraft. Tracer particle data reported by U.S. Transportation Command (TRANSCOM) and CFD simulations reported by Boeing were used, along with NIOSH data, to build nonlinear regression models with particle exposure and distance from particle source as variables. These models that estimate exposure at given distances from the viral source were applied to evaluate exposure reductions when middle seats are vacant compared to full occupancy. Reductions averaged 54% for the seat row where an infectious passenger is located and 36% for a 24-row cabin containing one infectious passenger, with middle seats vacant. Analysis of the TRANSCOM data showed that universal masking (surgical masks) reduced exposures by 62% and showed masking and physical distancing provide further reductions when practiced together. For a notional scenario involving 10 infectious passengers, compared with no intervention, masking, distancing, and both would prevent 6.2, 3.8 and 7.6 secondary infections, respectively, using the Wells-Riley equation. These results suggest distancing and masking reduce SARS CoV-2 exposure risk when an infectious passenger is present.

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