Bulletin de veille émissions d'aérosols par l'appareil respiratoire humain N° 10 – Juillet 2024

Objectifs : veille scientifique sur les émissions d'aérosols (gaz et particules) par l'appareil respiratoire humain (nez/bouche).

La validation des informations fournies (exactitude, fiabilité, pertinence par rapport aux principes de prévention, etc.) est du ressort des auteurs des articles signalés dans la veille. Les informations ne sont pas le reflet de la position de l'INRS. Les éléments issus de cette veille sont fournis sans garantie d'exhaustivité.

Les liens mentionnés dans le bulletin donnent accès aux documents sous réserve d'un abonnement à la ressource.

Les bulletins de veille sont disponibles sur le portail documentaire de l'INRS. L'abonnement permet de recevoir une alerte mail lors de la publication d'un nouveau bulletin (bouton « M'abonner » disponible après connexion à son compte).

Deng X, Gong G, Yang X.

Investigation of the effects of indoor air stability on the airborne transmission of droplets from violent respiratory events.

Indoor Environments. 2024;1(3):100036.

https://doi.org/10.1016/j.indenv.2024.100036

Indoor air stability is a condition under which the indoor temperature gradients can affect the trajectories of constant breathing flows. However, it remains unclear how indoor air stability affects the airborne contaminants from violent respiratory events such as coughing. Here, we report a study of the dispersion of airborne droplets from coughing under different indoor air stability conditions. The distributions of droplets from coughing processes under stable and unstable conditions were compared. The results revealed that the stable conditions confined the coughed droplets to the breathing zone of the droplet host, whereas the unstable conditions intensified the dispersion of droplets and reduced their local concentration. The dimensionless vertical distance of the droplet cloud under the stable condition was 4 times longer than that of the unstable condition at t = 15 s. In addition, we observed that high ventilation rate caused an intense mixing of the indoor air, thus weakening the effect of indoor air stability on the propagation of droplet cloud. Personal exposure of the stable condition was 6.5 times larger than that of the unstable condition at a ventilation rate of 2.1 ACH, while it decreased to lower than half of that of the unstable condition at 7.1 ACH and 12.3 ACH. Personal exposure to the indoor environment should be assessed by simultaneously considering the indoor air stability conditions and ventilation rates. This study has provided insights into the transmission of cough droplets in indoor environments and has practical significance for preventing the spread of contagious diseases.

Maalouf A, Palonen E, Geneid A, Lamminmäki S, Sanmark E.

Aerosol generation during pediatric otolaryngological procedures.

Int J Pediatr Otorhinolaryngol. 2024;183:112030.

https://doi.org/10.1016/j.ijporl.2024.112030

OBJECTIVES: To assess the extent of staff exposure to aerosol generation in common pediatric otorhinolaryngological procedures (tonsillotomies, adenoidectomies, and tympanostomies) and determine the surgical phases responsible for most aerosol generation in these procedures. METHODS: Aerosol generation was measured during 35 pediatric otolaryngological procedures using an Optical Particle Sizer that measures aerosol concentrations for particle sizes between 0.3 and 10.0 µm. The different phases of and instruments used in each procedure were logged. Operating room background aerosol levels and coughing were used as references. RESULTS: Total aerosol concentrations were significantly higher during tonsillotomies and adenoidectomies when compared to tympanostomies ($p = 0.011$ and $p = 0.042$) and to empty room background aerosol concentrations ($p = 0.0057$ and $p < 0.001$). Aerosol concentration during tonsillotomies did not differ from coughing, which is considered as standard for high-risk aerosol procedures. During tympanostomies, aerosol concentrations were even lower than during perioperative concentrations. No statistically significant difference in aerosol generation comparing suction, electrocautery, cold instruments, and paracentesis was found. CONCLUSION: According to the results of this study, tympanostomies are low-risk aerosol-generating procedures. On the other hand, pediatric tonsillotomies produced aerosols comparable to coughing, pointing to them being significantly aerosol-producing procedures and viral transmission is theoretically possible intraoperatively.