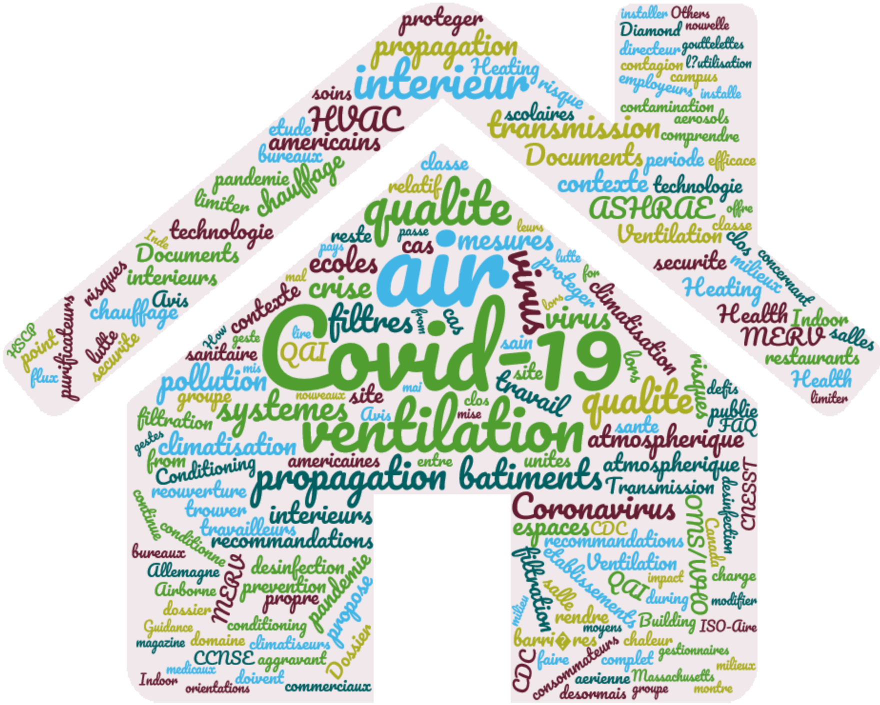

Bulletin de veille AéroCovid
N°128 – 24/12/2025

Objectif : *Air intérieur, ventilation, climatisation et propagation du Covid-19*

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 founis 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 connection à son compte).

Google Scholar, Lens et WoS

S.G, K., Nitin B, K., A.J, M.

Aeromycological indoor environmental study of K.T.S. General hospital Gondia, Maharashtra) India.

The Bioscan, Vol. **20** n°(Special Issue-2), (2025), 39-44 p.

Fungal spores in indoor air may come from outdoor by ventilation or they may originate within (Kukreja et. al., 2014). When these spores get favorable conditions they proliferate and cause the deterioration. An aeromycological study verifies the presence and quantifies the concentration of fungal propagules in the air. It is very important in the hospital setting because of the increasing numbers of immune suppressed and severely ill patients (Waghare et al., 2016) .The objective of this study was to determine the concentration of fungi in the air of the different sections like Outdoor Patient Department (O.P.D) Operation Theater (O.T.) and General Ward Section, of K.T.S General Hospital Gondia.

The total 1349 colonies were trapped from feb.2023 to Jan 2024 by exposure petriplate method. Out of 1349 colonies, total 508 colonies found in O.P.D, 481 colonies found in General ward and 360 colonies found in Operation Theater of hospital. The maximum fungal spores were recorded in O.P.D. section followed by general ward while minimum fungal spores seen in Operation Theater of K.T.S General hospital Gondia. Total 6990 CFUs/m3 are observed by Hi- media air sampler method. There was 2575 CFUs/m3 found in O.P.D. section while 2370 CFUs/m3 in General Ward and 2045 CFUs/m3 O.T.section. Fungi found in indoor environment of hospital are Aspergillus, Cercospora, Mucor, Penicillium, Rhizoctina, Cladosporium, Rhizopus and Alternaria.

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Hirai, S., Angga, M. S., Hosoda, S., Haramoto, E.

Development of a novel method to detect indoor SARS-CoV-2 from the dust collection filters of air purifiers.

Next Research, Vol. **3**, (2026)

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the causative agent of coronavirus disease 2019 (COVID-19), can survive in the air for several hours, which poses a risk of airborne transmission and cluster infection, especially in enclosed settings. The recovery of viruses from filters associated with the air purifiers could be an effective means of detecting indoor SARS-CoV-2; however, no standard method has yet been established. This study developed a method to detect indoor SARS-CoV-2 from different types (Types A–C) of air purifiers by elution through ultrasonication, followed by virus concentration, RNA extraction, and reverse transcription quantitative polymerase chain reaction. Among the three virus concentration methods tested, the filtration method demonstrated superior effectiveness. Among 233 filters from three types of air purifiers collected 17 times from each of the 11 locations in a hospital, SARS-CoV-2 RNA was successfully detected from 64 % (11/17) to 100 % (17/17) in samples from all locations, and a higher viral load (mean ± standard deviation, 2.9 ± 0.8 log10 copies/day) was recovered in the COVID-19 inpatient rooms. The recovered viral load from the Type A and B filters was not positively correlated with the COVID-19 inpatient cases (Pearson's r = −0.07 and 0.35, respectively), while that from the Type C filter was positively correlated (Pearson's r = 0.82). This method enables the visualization of SARS-CoV-2 load in each sampling location, thereby helping prevent nosocomial infections and contributing to the potential improvement of public health by facilitating the implementation of appropriate infection control measures.

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Abdul Wahab, H., Othman, M., A. Wahab, M. I., Izaham, A., Teo, R., Mohamad Mahdi, S. N.

Effectiveness of a biological isolation chamber in containing and evacuating aerosolised particles during patient transport the simulation transport.

Malaysian Journal of Anaesthesiology, Vol. **4** n°(2), (2025), 139-156 p.

Introduction: The BIOBASE biological isolation chamber (BBIC) was used to limit the spread of SARS-CoV-2 transmission during transport of COVID-19 patients. We aim to study the effectiveness of BBIC in limiting the spread of aerosol during static transport amongst healthcare workers.

Methods: Nebulised saline 0.9% was generated to saturate aerosolised particles within the BBIC placed within a constructed outer enclosure. Negative pressure was activated and particulate matter (PM), PM10 and PM2.5 concentrations were measured over 60 minutes using sensors placed inside (Cin) and outside (Cout) the BBIC. Control, closed ports, and open port models were developed to assess the effectiveness of the BBIC in containing and evacuating aerosolised particles. The ratio of measured Cin to Cout, designated as Fiso, (Fiso = Cin/ Cout) was derived.

Results: The differences in Fiso value of PM10 compared to PM2.5 in the closed-ports test were significant at minute 15 and 25 ($p < 0.001$, respectively). The differences in Fiso value of PM10 compared to PM2.5 in the open-ports test were significant at minute 15 ($p < 0.001$), suggesting that both the closed- and open-ports tests effectively contained the PM10 compared to PM2.5 aerosolised particles. The Fiso negatively correlated with time for the open-ports ($r = -0.79$, $p = 0.035$) and closed-ports tests ($r = -0.79$, $p = 0.035$) for PM10.

Conclusions: The closed and open BBIC ports effectively contain and evacuate PM10 aerosolised particles during simulation of static transport of COVID-19 patients. The BBIC contains and evacuates PM10 more effectively than PM2.5 aerosolised particles.

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Romero Barriuso, Á., Ballesteros Álvarez, J. M., Villena Escribano, B. M., Rodríguez Saiz, Á., González Gaya, C.

Enhancing Indoor Air Quality Through Natural Ventilation: Insights from a Municipal Building in Mostoles, Spain.

Revista Dyna, (2025)

This study evaluates the effectiveness of natural ventilation in enhancing indoor air quality within the Almudena Grandes Central Library, a municipal building in Móstoles, Spain. Triggered by the public health challenges highlighted during the SARS-CoV-2 pandemic, the research develops a methodological framework that integrates CO2 monitoring, occupancy modeling, and airflow calculations to assess air renewal capacities under natural ventilation conditions. The analysis reveals that cross ventilation is the only strategy capable of achieving IDA 2 air quality standards in high-occupancy areas, requiring at least five air changes per hour. Zenithal openings, such as roof ventilators, significantly enhance airflow during colder months with strong indoor-outdoor thermal differentials, even when external wind is minimal—a frequent scenario in continental Spanish climates. The study also explores buoyancy and wind-driven ventilation mechanisms and quantifies their respective contributions using empirical models. Results suggest that the library can maintain acceptable air quality for up to 310 users with sufficient cross-ventilation measures. However, single-sided ventilation proves inadequate. The proposed model supports dynamic capacity management and energy efficiency by integrating real-time environmental data. The authors highlight the potential of automating ventilation systems via domotics for continuous air quality monitoring and optimization. Limitations include the variability of outdoor conditions and the need for future validation using Computational Fluid Dynamics (CFD) and additional case studies. Overall, the findings emphasize architectural strategies as pivotal in promoting healthier, energy-efficient indoor environments in public infrastructure.

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Wu, X., Zhang, H., Ng, T. S. T., Lai, A. C. K.

Improving Far-UVC Disinfection Efficiency in Portable Devices: Optical Enhancement and Agent-Based Lamps' Layout Optimization.

Building and Environment, (2025)

This study investigated a portable 222 nm far ultraviolet C (far-UVC) air disinfection device by progressing through three key phases: model validation, followed by sequential enhancement, and culminating in real-room validation. The irradiance prediction and Eulerian CFD disinfection models were validated by measurements, with an average error of <5%. Based on this validation, a sequential enhancement strategy was developed. The addition of reflective anodized aluminum not only increased the volume-averaged irradiance from 112.4 to 169.3 μW/cm², but also altered the light distribution, resulting in an improvement in disinfection efficiency from 49.3% to 61.6%. Further optimization using an agent-based actor–critic algorithm increased the volume-averaged irradiance to 175.8 μW/cm², raised the uniformity index from 0.51 to 0.61, and lifted the single-pass efficiency to 66.4%. Validation in a room-sized chamber at an airflow rate of 84 m³/h showed that applying the baseline single-pass efficiency of 49.3% would yield a UVC-induced decay rate kuv of only 0.0333 min^{-1}, whereas the optimized device achieved 0.0466 min^{-1}—an improvement of about 39.9%. These results confirm the effectiveness of irradiance enhancement and optimized lamp placement in improving device performance.

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Malok, M., Kavšek, D., Remškar, M.

The Selective Detection of Individual Respiratory Droplets in Air.

ACS Sensors, (2025)

Preventing the spread of airborne diseases in crowded indoor spaces is a global challenge. Infected individuals release virus-laden respiratory droplets (RDs) that can remain suspended in air and infectious for hours. Current monitoring methods cannot distinguish these droplets from airborne particulate matter (PM) in a real time. Here, we present a capacitive sensor that selectively detects and counts the individual droplets in indoor spaces, regardless the presence of PM. The device exploits the dielectric constant (ε) of water (78.2) to differentiate the droplets from solid PM particles (ε < 15). In a nonventilated conference-room study, RDs concentrations (40–330 RDs/L) were found to be correlated with human occupancy, but not with PM2.5 levels. The developed technology enables a real-time monitoring of number concentration of RDs, which represent a potential health risk when they carry viral or bacterial infections. The detected increase in RD concentration can serve as a trigger for data-driven ventilation and infection-prevention measures, providing an effective tool for mitigating the spread of respiratory diseases in hospitals, schools and other public spaces.

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Chen, Y., Curran, A.

Workplace health and safety lessons from the COVID-19 pandemic: insights from investigating workplace outbreaks in England.

BMJ Publishing Group Ltd 2025

This report presents a detailed review of how COVID-19 affected occupational safety and health (OSH) in England and outlines key lessons for future pandemic preparedness. It draws on workplace outbreak investigations, scientific studies, and workplace assessments to inform future planning and resilience.

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