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Aéraulique et COVID-19

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Google Scholar, Lens et WoS

Yuce, B. E., Aganovic, A., Nielsen, P. V., Wargocki, P.
Analysis of parameters influencing pathogen concentration in a room with displacement ventilation using computational fluid dynamics and Taguchi methods.
Journal of Building Engineering, Vol. **80**, (2023)

Analyzing multiple physical factors simultaneously to determine optimal ventilation solutions can be challenging. Furthermore, this type of analysis needs a large case number to be investigated, making the problem's solution unfeasible. This study tackled these challenges by integrating Computational Fluid Dynamics (CFD) with the Taguchi method to overcome these issues. Our previous research extensively examined the application of the Taguchi method in ventilation studies. Now, we analyzed the influence of different factors on pathogen concentration in a room equipped with displacement ventilation. Initially, the study examined the effects of room dimensions and the location, position, velocity, and temperature of the inlet and outlet of the ventilation system. The Taguchi method was employed to manage the complexity of the analysis, resulting in a reduced set of 27 cases from a total of 19683 possible combinations. The findings revealed that the inlet velocity was the most influential parameter in minimizing pathogen concentration; however, room volume has a limited effect. Subsequently, the optimal solution obtained through the Taguchi method was modeled using CFD and validated. Then, these results were compared against the results of the Wells-Riley model, which utilized room volume and inlet velocity as input variables. In the second step, additional parameters were investigated while keeping the room volume constant. This analysis reaffirmed the significant impact of inlet velocity on pathogen concentration, as observed in the initial study. Additionally, it was found that inlet temperature had a greater influence on pathogen concentration in rooms with smaller dimensions.

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Kallegias, A., Costabile, I., Robins, J. C.
The Corona Decade: The Transition to the Age of Hyper-Connectivity and the Fourth Industrial Revolution.
In: Architecture and Design for Industry 4.0: Theory and Practice. Springer International Publishing; 2024. 169-183 p.

The COVID-19 pandemic continues to profoundly affect the world socially and economically. The quarantine and isolation strategies adopted globally have advanced online trade to a new level, as people are finding new ways to provide products and services from home. Several digital tools are gaining popularity and delivery services are ramping up production to meet the increased demand. This paper analyses the current situation considering the impact of COVID-19 in technology and society. The first part of the analysis consists of historical connections between epidemics and technological progress. The paper charts the impacts these have had on society and where they have come to define each industrial revolution. The second part of the analysis explores the different strategies to contain the coronavirus and protect economies. Comparisons between countries are developed through available data and displayed in charts. Furthermore, the paper demonstrates the impact of the strategies on social lives and the economic shift from physical to online. It explores the creative adoption of platforms and technologies that are driving the new revolution. As a case study, it also focuses on ‘‘the field of architecture and reviews the case of the live data collection process that is made after the erection of an edifice. Through a practice-based project, it speculates on enhancing the energy performance of a building via applying computational techniques to the collected data. It describes the system of an ad-hoc sensory device that gathers energy data from a building as a different option from existing HVAC systems. Considering COVID-19's high impact on society, drastically altering the way the market

operates, we suggest this moment as the true beginning of the Fourth Industrial Revolution, bringing with it a new historical narrative.

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Mizukoshi, A., Okumura, J., Azuma, K.
A COVID-19 cluster analysis in an office: Assessing the long-range aerosol and fomite transmissions with infection control measures.
Risk analysis : an official publication of the Society for Risk Analysis, (2023)

Simulated exposure to severe acute respiratory syndrome coronavirus 2 in the environment was demonstrated based on the actual coronavirus disease 2019 cluster occurrence in an office, with a projected risk considering the likely transmission pathways via aerosols and fomites. A total of 35/85 occupants were infected, with the attack rate in the first stage as 0.30. It was inferred that the aerosol transmission at long-range produced the cluster at virus concentration in the saliva of the infected cases on the basis of the simulation, more than 10(8) PFU mL(-1) . Additionally, all wearing masks effectiveness was estimated to be 61%-81% and 88%-95% reduction in risk for long-range aerosol transmission in the normal and fit state of the masks, respectively, and a 99.8% or above decline in risk of fomite transmission. The ventilation effectiveness for long-range aerosol transmission was also calculated to be 12%-29% and 36%-66% reductions with increases from one air change per hour (ACH) to two ACH and six ACH, respectively. Furthermore, the virus concentration reduction in the saliva to 1/3 corresponded to the risk reduction for long-range aerosol transmission by 60%-64% and 40%-51% with and without masks, respectively.

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Risbeck, M. J., Cohen, A. E., Douglas, J. D., Jiang, Z., Fanone, C., Bowes, K.*, et al.*
Data-driven control of airborne infection risk and energy use in buildings.
Building and Environment, Vol. **245**, (2023)

The global devastation of the COVID-19 pandemic has led to calls for a revolution in heating, ventilation, and air conditioning (HVAC) systems to improve indoor air quality (IAQ), due to the dominant role of airborne transmission in disease spread. While simple guidelines have recently been suggested to improve IAQ mainly by increasing ventilation and filtration, this goal must be achieved in an energy-efficient and economical manner and include all air cleaning mechanisms. Here, we develop a simple protocol to directly, quantitatively, and optimally control transmission risk while minimizing energy cost. We collect a large dataset of HVAC and IAQ measurements in buildings and show how models of infectious aerosol dynamics and HVAC operation can be combined with sensor data to predict transmission risk and energy consumption. Using this data, we also verify that a simple safety guideline is able to limit transmission risk in full data-driven simulations and thus may be used to guide public health policy. Our results provide a comprehensive framework for quantitative control of transmission risk using all available air cleaning mechanisms in an indoor space while minimizing energy costs to aid in the design and automated operation of healthy, energy-efficient buildings.

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Rivas-Macho, A., Eletxigerra, U., Diez-Ahedo, R., Barros, A., Merino, S., Goni-De-Cerio, F.*, et al.*
Development of an Electrochemical Sensor for SARS-CoV-2 Detection Based on Loop-Mediated Isothermal Amplification.
Biosensors, Vol. **13** n°(10), (2023)

The pandemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) caused more than 6 million deaths all over the world, demonstrating the need for a simple, fast and cost-effective point-of-care (POC) test for the detection of the virus. In this work, we developed an electrochemical sensor for SARS-

CoV-2 virus detection on clinical samples based on loop-mediated isothermal amplification (LAMP). With the development of this novel sensor, the time of each measurement is significantly reduced by avoiding the DNA extraction step and replacing it with inactivation of the sample by heating it at 95 °C for 10 min. To make the reaction compatible with the sample pre-treatment, an RNase inhibitor was added directly to the premix. The LAMP product was measured in a novel, easy-to-use manufactured sensor containing a custom-made screen-printed carbon electrode. Electrochemical detection was performed with a portable potentiostat, and methylene blue was used as the redox-transducing molecule. The developed sensor achieved a limit of detection of 62 viral copies and was 100% specific for the detection of the SARS-CoV-2 virus. The performance of the electrochemical sensor was validated with nasopharyngeal samples, obtaining a sensibility and specificity of 100% compared to the gold standard RT-PCR method.

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Andrews, J. R., Liu, Y. E., Croda, J.
Enduring Injustice: Infectious Disease Outbreaks in Carceral Settings.
The Journal of Infectious Diseases, (2023)

From the late 16th through the 18th century, louse-borne typhus swept through English prisons and into courtrooms, claiming the lives of judges, jurors, and constables and spilling out into the surrounding populations. These large outbreaks of “gaol fever,” which killed up to a quarter of incarcerated individuals, came to be known as the “Black Assizes” and ultimately drew attention to the overcrowded, unsanitary conditions of incarceration. In response, Parliament passed (1774) the “Act for Preserving the Health of Prisoners in Gaol,” one of the earliest public health measures to require basic sanitation, ventilation, isolation measures, and disease reporting in carceral settings.

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Zhao, W., Ejaz, F., Kilpeläinen, S., Kosonen, R.
Exploring the potential to mitigate airborne transmission risk with micro-environment ventilation in an office.
Sisäilmastoseminaari - Helsinki, Finland. 14 Mar 2023

In the background of COVID-19, new requirements are occurring in the novel ventilation systems to mitigate airborne transmission risk in indoor environments. In this study, two micro-environment ventilation systems: personalized ventilation combined with radiant panel system (PVRP) and low velocity unit combined with radiant panel system (LVRP) were studied to explore the potential of reducing the airborne infection risk. In a simulated double layout office, the droplets generated by a thermal breathing manikin were used to simulate the breathing process of an infected person. Opposite the manikin, a heated dummy was as an exposed person. During the 102-minute measurement, the results show that the infection risk at the inhaled air with micro-environment systems is lowest. The heat gain levels do have much effect on infection risk with the PVRP system, but higher heat gain will increase the risk slightly with the LVRP system.

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Becchio, C., Paolo Corgnati, S., Crespi, G., Lingua, C.
Impacts of different AHU configurations on health and students’ performance in Italian schools in post-pandemic era.
Sustainable Energy Technologies and Assessments, Vol. **60**, (2023)

With the spread of the COVID-19 pandemic, several countermeasures in HVAC systems operation have been undertaken to reduce the risk of infection, guaranteeing proper indoor conditions for occupants’ health and performance. Especially in school buildings, where students spend most of their time inside classroom, ensuring a good indoor air quality represents a key factor. For this reason, to gradually return to normal HVAC

systems operation, innovative technologies, among which photocatalytic air filters, are in the spotlight. Due to their higher investment costs, there is the need to develop proper methodological approaches able to make their energy, health and performance benefits quantifiable and apparent to consumers, to support the decision-making process. In this context, the paper aims to develop a cost-benefit analysis to compare the impacts of two air handling unit configurations installed in typical Italian schools, being representative of both COVID-19 and post-COVID-19 conditions. The benefit-cost ratio indicator is chosen to present the results showing the goodness of the installation of innovative filtering technology in the post-COVID-19 configuration, in terms of energy-, health- and performance-related benefits.

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Aguilar, A. J., De La Hoz-Torres, M. L., Costa, N., Arezes, P., Martínez-Aires, M. D., Ruiz, D. P.
Indoor acoustic quality of educational buildings in South West Europe: Influence of current ventilation strategies.
Journal of Building Engineering, Vol. **80**, (2023)

The quality of the classroom environment has a great impact on the physical and mental health of students and teachers. The COVID-19 pandemic has highlighted the need for new measures and ventilation strategies to be implemented in educational buildings, to ensure indoor air quality in classrooms and to minimise the risk of airborne virus transmission. However, these ventilation protocols can influence the acoustic quality of classrooms and negatively affect students' speech perception and learning performance. This study presents the results obtained from a field measurement campaign carried out to assess the acoustic characteristics of classrooms of the Fuentenueva Campus (University of Granada) and Azurém Campus (University of Minho). Different ventilation operating scenarios (active and inactive) were assessed to evaluate their impact on the indoor acoustic conditions. The reverberation time (RT), the only parameter used in both countries' regulations to assess acoustic conditions, was found to be higher on both campuses than the RT limits values. Comparison of the measured Speech Transmission Index (STI) and background noise values in the active and inactive ventilation scenario showed a clear variation of the indoor acoustic conditions. The background noise was higher in the active ventilation scenarios (40–57 dBA) than in the inactive ventilation scenarios (34–48 dBA). The average STI values obtained on both campuses for the inactive and active scenarios were 0.54 and 0.51, respectively. In some classrooms an STI difference of 0.1 was found between scenarios. The results obtained in this study provide a broader understanding of the acoustic conditions in university classrooms in Spain and Portugal. The results evidence the need of consider the synergies between the indoor acoustic and air quality conditions to ensure both: the spaces are safe and the acoustic conditions do not interfere with students' learning. The findings show that compliance with the current RT requirements does not ensure that classroom acoustic conditions do not interfere with student performance, and therefore, regulations need to be revised to include additional factors to ensure proper acoustic performance.

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Aho Glele, L. S., De Rougemont, A.
Non-Pharmacological Strategies and Interventions for Effective COVID-19 Control: A Narrative Review.
Journal of clinical medicine, Vol. **12** n°(20), (2023)

The COVID-19 pandemic had a devastating impact on the world, causing widespread illness and death. Focusing on prevention strategies to limit the spread of the disease remains essential. Despite the advent of vaccines, maintaining a vigilant approach to prevention remains paramount. We reviewed effective strategies to prevent COVID-19 transmission, including various prevention measures and interventions and both established practices and unresolved issues that have been addressed in meta-analyses, literature reviews, or in the health care context. Standard precautions are the cornerstone of infection control, with hand hygiene and mask use as key components. The use of surgical masks is recommended to prevent droplet transmission, while eye protection is recommended in combination with masks. In terms of room occupancy, ventilation is

critical in reducing the risk of transmission in poorly ventilated environments. Chemical disinfection of indoor air with Triethylene glycol-based products can provide safe additional protection. Since viral RNA detection on surfaces does not necessarily indicate infectivity, the risk of transmission by surface contact remains low if surfaces are properly maintained and hand hygiene is practiced regularly. Thus, prevention of SARS-CoV-2 transmission requires a multifaceted approach, including reducing particle emissions from infected persons by wearing masks, eliminating aerosols by ventilation and air treatment, ensuring physical separation, and protecting exposed persons with masks and eye protection.

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Zhang, H., Ding, X., Zhang, W., Zhang, W., Xuan, Y.
Optimising multi-vent module-based adaptive ventilation using a novel parameter for improved indoor air quality and health protection.
Building Simulation, (2023)

As infectious respiratory diseases are highly transmissible through the air, researchers have improved traditional total volume air distribution systems to reduce infection risk. Multi-vent module-based adaptive ventilation (MAV) is a novel ventilation type that facilitates the switching of inlets and outlets to suit different indoor scenarios without changing ductwork layout. However, little research has evaluated MAV module sizing and air velocity selection, both related to MAV system efficiency in removing contaminants and the corresponding level of protection for occupants in the ventilated room. Therefore, the module-source offset ratio (MSOR) is proposed, based on the MAV module size and its distance from an infected occupant, to inform selection of optimal MAV module parameters. Computational fluid dynamics simulations illustrated contaminant distribution in a two-person MAV equipped office. Discrete phase particles modelled respiratory contaminants from the infected occupant, and contaminant concentration distributions were compared under four MAV air distribution layouts, three air velocities, and three module sizes considered using the MSOR. Results indicate that lower air velocities favour rising contaminant levels, provided the ventilation rate is met. Optimal contaminant discharge can be achieved when the line of outlets is located directly above the infected occupant. Using this parameter to guide MAV system design, 85.7% of contaminants may be rendered harmless to the human body within 120 s using the default air vent layout. A more appropriate supply air velocity and air vent layout increases this value to 91.4%. These results are expected to inform the deployment of MAV systems to reduce airborne infection risk.

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Feng, Y., Zhu, H., Feng, X., Chen, Q., Sun, X., Li, Z.
Optimization of Dual-Design Operation Ventilation System Network Based on Improved Genetic Algorithm.
Preprints, (2023)

The COVID-19 pandemic has emphasized the crucial role of ventilation systems in mitigating cross-infections, especially in infectious disease hospitals. This study introduces a dual-design operation ventilation system that can operate under two sets of ventilation conditions for normal and epidemic times. A challenge is optimizing duct diameters for required airflow while maintaining hydraulic balance. We design a genetic algorithm with adaptive penalty factor, the velocity constraint and the improved crossover and mutation probability. The improved genetic algorithm is suitable for ventilation system networks, which can find a better air duct diameters combination to improve the hydraulic balance rate, and reduce the usage of air valves, resulting in efficient hydraulic balancing commissioning. Compared with the traditional genetic algorithm, it has a faster search speed and a better global search ability, which is effective for the optimal design of ventilation system networks.

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Taylor, J., Ratnesar-Shumate, S., Pollitt, K., Huffman, J. A.

Proceedings from a special symposium and panel session on the aerosol science of infectious diseases: what we learned and what we still need to know.
Aerosol Science and Technology, Vol. **57** n°(12), (2023), 1175-1177 p.

During the American Association for Aerosol Research (AAAR) 40th Annual Conference in 2022, a special symposium was organized on the Aerosol Science of Infectious Diseases: What We Have Learned and Still need to Know About Transmission, Prevention, and the One Health Concept. Aerosol experts from across government and academia who played key roles in the response to the COVID-19 pandemic contributed to a panel discussion session. The experts shared their experiences, challenges, and successes from each of their unique perspectives. Despite different backgrounds and roles in the COVID-19 response, similar themes from the panelists quickly emerged during the symposium. Although panels were split into two sessions - What We Learned and What We Still Need to Know - both panels brought up similar challenges and recommendations. While the experiences were in response to COVID-19, the findings are broadly applicable to any future emerging infectious disease of widespread public importance. The moderators of this panel sought to capture these themes and lessons to enable an improved response by the aerosol sciences community to the next emerging infectious disease outbreak, and these are summarized here.

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Yan, C., Hu, Y.-N., Gui, Z.-C., Lai, T.-N., Ali, W., Wan, N.-H.*, et al.*
Quantitative SARS-CoV-2 exposure assessment for workers in wastewater treatment plants using Monte-Carlo simulation.
Water Res, (2023)

Several studies on COVID-19 pandemic have shown that the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) originating from human stool are detected in raw sewage for several days, leading to potential health risks for workers due to the production of bioaerosols and droplets during wastewater treatment process. In this study, data of SARS-CoV-2 concentrations in wastewater were gathered from literatures, and a quantitative microbial risk assessment with Monte Carlo simulation was used to estimate the daily probability of infection risk through exposure to viable infectious viral airborne particles of the workers during four seasons and under six environmental conditions. Inhalation of bioaerosols and direct ingestion of wastewater droplets were selected as exposure pathways. Spearman rank correlation coefficients were used for sensitivity analysis to identify the variables with the greatest influence on the infection risk probability. It was found that the daily probability of infection risk decreased with temperature (T) and relative humidity (RH) increase. The probability of direct droplet ingestion exposure pathway was higher than that of the bioaerosol inhalation pathway. The sensitivity analysis indicated that the most sensitive variable for both exposure pathways was the concentration of SARS-CoV-2 in stool. So, appropriate aeration systems, covering facilities, and effective ventilation are suggested to implement in wastewater treatment plants (WWTPs) to reduce emission concentration. Further to this, the exposure time (t) had a larger variance contribution than T and RH for the bioaerosol inhalation pathway. Implementing measures such as adding more work shifts, mandating personal protective equipment for all workers, and implementing coverage for treatment processes can significantly reduce the risk of infection among workers at WWTPs. These measures are particularly effective during environmental conditions with low temperatures and humidity levels.

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Kono, H.
Statistical data analysis of expiratory droplet mass during talking and prediction of SARS-CoV-2 number concentrations using dispersion models.
Journal of Japanese Scientists, Vol. **58** n°(9), (2023)

In order to investigate droplet nuclei infection, diffusion models are used to calculate the number concentration of SARS-CoV-2 in expiratory droplets during conversation in indoor and outdoor settings. Measurement data from published papers on the diameters and masses of droplets emitted during conversation are analysed to obtain a reliable mean for the prediction. The 95% confidence interval for the population mean of the released expiratory droplet mass in droplets of size 100 µm or less falls within a relatively small variation of 0.5 to 1.5 times the sample mean. The cut-off diameter is set in the range of 70–100 µm indoors and 70–130 µm outdoors, depending on the relative humidity. The virus number concentration is calculated and the relationship between the number of viruses inhaled by breathing and the ventilation rate of the room is studied. The ventilation rate is represented by the CO2 concentration in the room. When one super-spreader speaks in a room for 1 hour, the calculated result is that the dose of the virus inhaled in 1 hour exceeds the infection threshold, even if the ventilation volume in the room is very high. In this case, most of the people in the room will be infected. These predictions are consistent with previously reported infection data that transmission occurs indoors and are rare outdoors.

https://doi.org/10.60233/jjsci.58.9_5801

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Rattanatigul, Y., Hokpunna, A., Rungsiyakull, P., Suttiat, K.

Strategic Placement of Portable Air Cleaners for Enhanced Aerosol Control in Dental Treatment Rooms: A Computational Fluid Dynamics (CFD) Analysis.

Indoor Air, Vol. **2023**, (2023)

Background. Adequate ventilation is imperative for controlling respiratory transmission, particularly in the context of the COVID-19 pandemic. The commercial portable air cleaners have emerged as practical solutions to reduce contaminated aerosols in dental treatment rooms. This study employs computational fluid dynamics (CFD) to assess their impact on airflow dynamics. Methods. Dental treatment room models were constructed using SolidWorks software, encompassing two distinct air conditioner grille orientations (straightening and 45-degree downward directions) and five different positions for the portable air cleaner (two located at the rear left/right of the dental unit and three at the foot end of the dental unit—center, left, and right corners). The study examined alterations in airflow direction and residual aerosol concentrations using ANSYS Fluent software. Results. The incorporation of portable air cleaners in dental treatment rooms significantly reduced aerosol levels across all model configurations. Notably, the placement of the portable air cleaner emerged as a critical factor influencing airflow patterns. In models with straightening and 45-degree downward air conditioner grille orientations, optimal positioning was near the operating field and at the foot end of the dental chair, respectively. Conclusion. This investigation highlights the pivotal role of strategic portable air cleaner placement in dental treatment rooms for effective aerosol removal. Placing the air cleaner near the operating field or at the foot end of the dental chair not only improved airflow patterns but also enhanced aerosol removal efficiency, ultimately promoting superior air quality within dental treatment environments.

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Tabbasum, F., Shah, S. M. H., Teo, F. Y., Mustaffa, Z., Aleem, M. F., Khan, H. A.*, et al.*

A Sustainable Indoor Air Quality Monitoring Approach through Potable Living Wall for Closed Confined Spaces: A Way Forward to Fight Covid19.

Journal of Sustainability Perspectives, (2023), 10 p.

The COVID-19 pandemic has greatly influenced various aspects of life, part of which has consequently paved the way toward improvements in building design criteria, especially for closed confined spaces. The closed confined spaces are directly proportional to the quantity and quality of the volatile organic compounds (VOCs) present in the atmosphere, from which human beings breathe. In managing the impact produced by VOCs, a practical, sustainable, economical and environmentally friendly concept of indoor living walls has become a

prominent feature for improving the indoor air quality (IAQ) of closed confined spaces to efficiently reduce sick building syndrome (SBS) factors. In modification of common practice of ventilation systems, living wall technology leverages the natural ability of plants to purify indoor air quality by reducing air pollutants and allows the recycling of indoor air and the creation of a productive and inspiring environment. In this paper, the concept of a portable living wall through the use of a native plant species locally available in Sindh, Pakistan is introduced. Herein, the portable living concept was assessed by means of the design, construction, and data collection (testing and monitoring) of various environmental parameters carried out before and after the installation of the living wall. The study was monitored for 90 days, and analyses for various types of air pollutants were carried out in the environmental laboratory. During the monitoring period, the parameters humidity, VOCs, hazardous chemicals of concern (HCOC), CO 2 and CO showed reductions in their values, with changes observed ranging from 61.5 to 58%, 0.66 to 0.01 ppm, 0.2 to 0.01 ppm, 1070 to 528 ppm and 0.2 to 0.01 ppm, respectively. The outcomes showed noticeable changes in air pollutants coupled with reductions in heating, ventilation and air conditioning (HVAC) energy consumption by up to 25%, mainly due to limited air requirements for ventilation.

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Nourozi, B., Wierzbicka, A., Yao, R., Sadrizadeh, S.
A systematic review of ventilation solutions for hospital wards: Addressing cross-infection and patient safety.
Building and Environment, (2023)

Despite various preventive interventions, nosocomial cross-infection remains a significant challenge in healthcare facilities worldwide. Consequently, prolonged hospitalization, elevated healthcare costs, and mortality rates are major concerns. Proper ventilation has been identified as one of the possible interventions for reducing the risk of cross-infection between patients and healthcare workers in hospital wards by diluting infectious agents and their carrying particles. The use of air cleaners in conjunction with the ventilation system further reduces the concentration of indoor pathogens. This article presents a systematic review of the ventilation solutions employed in hospital wards where pathogen removal performance can be enhanced using air-cleaning techniques while maintaining the thermal comfort of patients and healthcare staff. We provide a comparative analysis of the performance of different ventilation strategies adopted in one-, two-, or multi-bed hospital wards. Additionally, we discuss the parameters that influence the aerosol removal efficiency of ventilation systems and review various air-cleaning technologies that can further complement the ventilation system to reduce contaminant concentrations. Finally, we review and discuss the impact of different ventilation strategies on the perceived thermal comfort of patients and healthcare workers. This study provides insights into the cross-contamination risks associated with various hospital ward setups and the vital role of the ventilation system in reducing the adverse effects of infection risk. The findings of this review will contribute to the development of effective ventilation solutions that ensure improved patient outcomes and the well-being of healthcare workers.

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Sklar, R., Noth, E., Kwan, A., Sear, D., Bertozzi, S.
Ventilation conditions during COVID-19 outbreaks in six California state carceral institutions.
PloS one, Vol. **18** n°(11), (2023)

Residents of carceral facilities are exposed to poor ventilation conditions which leads to the spread of communicable diseases such as COVID-19. Indoor ventilation conditions are rarely studied within carceral settings and there remains limited capacity to develop solutions to address the impact of poor ventilation on the health of people who are incarcerated. In this study, we empirically measured ventilation rates within housing units of six adult prisons in the California Department of Corrections and Rehabilitation (CDCR) and compare the measured ventilation rates to recommended standards issued by the World Health Organization

(WHO). Findings from the empirical assessment include lower ventilation rates than the recommended ventilation standards with particularly low ventilation during winter months when heating systems were in use. Inadvertent airflows from spaces housing potentially infected individuals to shared common spaces was also observed. The methodology used for this work can be leveraged for routine ventilation monitoring, pandemic preparedness, and disaster response.

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Widmer, F., Ritter, A., Onder, C. H.

ZTBus: A Large Dataset of Time-Resolved City Bus Driving Missions.

Scientific Data, Vol. **10** n°(1), (2023), 687 p.

This paper presents the Zurich Transit Bus (ZTBus) dataset, which consists of data recorded during driving missions of electric city buses in Zurich, Switzerland. The data was collected over several years on two trolley buses as part of multiple research projects. It involves more than a thousand missions across all seasons, each mission usually covering a full day of operation. The ZTBus dataset contains detailed information on the vehicle's power demand, propulsion system, odometry, global position, ambient temperature, door openings, number of passengers, dispatch patterns within the public transportation network, etc. All signals are synchronized in time and include an absolute timestamp in tabular form. The dataset can be used as a foundation for a variety of studies and analyses. For example, the data can serve as a basis for simulations to estimate the performance of different public transit vehicle types, or to evaluate and optimize control strategies of hybrid electric vehicles. Furthermore, numerous influencing factors on vehicle operation, such as traffic, passenger volume, etc., can be analyzed in detail.

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