Contribution ID: **61** Type: **Oral presentation**

ENVIRONMENTAL MONITORING OF RESPIRATORY VIRUSES (SARS-CoV-2, RESPIRATORY SYNCYTIAL VIRUS, AND INFLUENZA A) IN A HEALTHCARE SETTING

Tuesday, May 6, 2025 3:15 PM (15 minutes)

Background/Objective
The growing concern about the rapid spread of respiratory diseases has reinforced the importance of environmental monitoring of infectious diseases as an indispensable tool for public health. In particular, monitoring respiratory viruses in air samples is essential for early detection, prevention, and control of epidemic outbreaks, providing a more comprehensive understanding of transmission dynamics. Environmental monitoring not only helps identify the presence of pathogens but also enables for the assessment of their concentration in high-risk areas, contributing to more informed decision-making for preventive measures.
In the context of healthcare facilities, which are frequented by vulnerable population and where the presence of viruses might be more prevalent, such monitoring becomes even more essential. The ability to detect respiratory viruses such as SARS-CoV-2, Influenza A, and Respiratory Syncytial Virus (RSV) in hospital environments is crucial for assessing the risk of airborne transmission and evaluating the effectiveness of infection control measures. By identifying virus hotspots, targeted interventions can be implemented to reduce transmission, thereby ensuring the safety of patients, healthcare workers, and visitors.

This study aims to analyse the presence of respiratory viruses, including SARS-CoV-2, Influenza A, and RSV, in air samples collected from different areas within a hospital. Additionally, the study seeks to characterize the viral load in identified peaks to gain a deeper understanding of the concentration of these viruses in hospital settings, which could be useful to assess their potential contribution to hospital-associated outbreaks.

Methods
Between December 17, 2021, and January 19, 2023, air samples were collected in sterile 47 mm quartz fibre filters using Derenda low-volume samplers (2.3 m^3/h) equipped with PM2.5 inlets in a hospital located in Castelló de la Plana, Valencian Community, Spain. Samples were collected in consecutive 24-hour sampling cycles during weekdays.
RNA was extracted from the filters, which had been previously spiked with Mengovirus (MgV) as an internal extraction control. Subsequently, RT-qPCR analysis was conducted, targeting the E fragment of the SARS-CoV-2 envelope protein (E); the matrix (M) gene of Influenza A; and the matrix (M) gene of RSV. Clinical data from the hospital's emergency department was inspected to identify peaks in emergency cases associated with infections caused by these viruses. The medians and interquartile ranges (IQR) of viral concentrations during the identified peaks were calculated and expressed as genomic copies per cubic meter (gc/m^3).

Results
The mean recovery rate for the internal control MgV was 27 % ± 24 %. The analysis revealed an increase in emergency cases associated with infections caused by the three studied viruses as follows. There was peak of SARS-CoV-2 from December 17, 2021, to April 30, 2022. Two peaks of Influenza A were identified. A first peak in March and April 2022, and a second peak in December 2022. The peak of RSV occurred in November 2022. During the months when an increase in emergency cases associated with these viruses was observed, the median (IQR) number of emergency cases recorded were 8 (17), 3 (5), and 2 (2) for SARS-CoV-2, Influenza A, and RSV, respectively. The median (IQR) viral concentrations during the months with increased emergency cases associated with these viruses were 3.2 (6.2), 0.81 (1.5), and 3.3 (3.9) gc/m^3 for SARS-CoV-2, Influenza A, and RSV, respectively.

Conclusion

An increase in the genetic load corresponding to SARS-CoV-2, Influenza A, and RSV viruses has been detected in aerosols collected during the months that recorded a rise in emergency cases associated with these viruses at the reference hospital in Castelló. Future studies should explore the potential of measuring viral traces in aerosols as a tool for environmental surveillance of viruses.

Primary authors: Mr ALFARO, Carlos (Universitat Jaume I); Dr PORRU, Simona (Universitat Jaume I); Dr LLOPIS, Estefanía (Universitat Jaume I); Prof. ESTEVE CANO, Vicente José (Universitat Jaume I); Dr HERRERO CUCÓ, Luis Alfredo (Hospital General Universitario Castellón); Dr DE LLANOS, Rosa (Universitat Jaume I); DELGADO-SABORIT, Juana Maria (Universitat Jaume I)

Presenter: DELGADO-SABORIT, Juana Maria (Universitat Jaume I)

Session Classification: SESSION 2b - Exposure and Dose: Assessing the human health implications, Oral Presentations

Track Classification: Exposure and Dose: Assessing the human health implications. Moderators: Nancy Leung and Aneta Wierbizcka