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European Respiratory Cluster Antwerp

Point of View

Modern hospitals should focus more on air purification.

The health of individuals attending an environment in a health institution is closely related to the quality of the air they breathe. In the realm of healthcare, the importance of air quality extends far beyond mere comfort; it directly impacts the health and well-being of patients, staff, and visitors. Indoor air quality plays a crucial role in maintaining a safe and conducive healing environment. As healthcare facilities strive to provide top-notch medical care and for pandemic preparedness reasons, the focus on optimizing air quality has gained significant attention.
Clean air is a fundamental requirement for any healthcare facility. Contaminants such as airborne pathogens, volatile organic compounds (VOCs), allergens, and spores can compromise patient recovery. In high-complexity hospitals providing care to patients in various high-care units, environmental air quality directly influences the speed of recovery of patients and the occurrence of nosocomial infections due to the large supply of micro-organisms (environmental contaminants) that come from the outside air, the air conditioning system, construction, furniture, carpet, and especially of its occupants. But which hospital environments are particular focus areas for the enhancement of air quality?

Improved air quality positively impacts overall public health and is paramount in several healthcare-related facilities. However, considering the number of visitors, the flow of numerous people gathering in lobbies, restaurants, and other public spaces, and the density of potentially vulnerable and immunosuppressed patients, hospitals are in particular to be considered the number one priority location for air quality assessment. **Within the complexity of the several hospital entities, some units are to be considered more crucial than others in terms of air quality risks.**

Pulmonary medicine units treating patients with conditions like asthma, chronic obstructive pulmonary disease (COPD), and other respiratory disorders are particularly sensitive to poor air quality. Enhancing air quality can lead to reduced exacerbations and better management of these conditions and improved overall lung function.

As children are more vulnerable to the effects of air pollution due to their developing respiratory systems, enhancing air quality can help reduce the incidence of respiratory infections, asthma attacks, and other respiratory issues in pediatrics, and in particular the neonatology unit. Intensive care and emergency medicine are also considered high-risk zones as poor air quality can lead to respiratory distress and exacerbate existing medical conditions. By improving air quality, emergency departments may see a reduction in cases related to respiratory distress.

As older adults are also at higher risk for the adverse effects of air pollution, improved air quality at the geriatrics department can contribute to better respiratory health among the elderly and potentially reduce hospitalization time.

All care units with immunosuppressed patients are particular focus areas for infection prevention requirements, of which air quality is to be considered an essential element. In these high-care units, airborne infection control and maintaining optimal air quality are especially critical in preventing the spread of infections. The risks are known and the measurements to prevent airborne pathogens, such as bacteria and viruses, are in most cases controlled through proper ventilation, air filtration, and disinfection techniques. Particulate air (HEPA) filters are among the traditional technologies employed to reduce the risk of airborne transmission. **But as filters can get clogged, a decontamination air quality technology based on electrostatic precipitation filtration (EPF) can be a valuable complementary asset in these high-risk medical units. With this technology the smallest nanosize particles are captured and destroyed inside the device.**
With this technology, the smallest nanosized particles down to 0,003 µm (and thus all microbes) are eliminated in a high-voltage process.
It would be an interesting assessment for hygienists to quantify the healthcare outcome of this innovative technology and evaluate the effect of air decontamination above filtering in terms of the decreased numbers of HAI patients.

Volatile Organic Compounds (VOCs) in hospital areas

Volatile organic compounds (VOCs) are contaminants commonly found in the indoor environment. VOCs are a group of carbon-containing chemicals that can easily evaporate into the air at room temperature. They are emitted as gases from certain solids and liquids and can contribute to indoor air pollution.

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VOCs can come from a variety of sources, in a hospital environment, the use of hand sanitizers for example is common, which can contribute to an increased VOC concentration of indoor air.
Typically, ethanol and propanol concentrations increased when using hand sanitizers. Furthermore, other **special chemicals such as formaldehyde are also used in the operating and recovery rooms, such as alcohol-and chlorine-based cleaning chemicals, anesthetic gases, and pharmaceutical chemicals which can affect the air quality**.

The use of laboratory chemicals in the hospital's lab and pharmaceutical components in the hospital's pharmacy are areas of interest for the presence of VOCs.

Traditional HEPA filters will not effectively remove the hazardous VOCs but effective active carbon collectors can eliminate these gaseous compounds and smells.

The longevity and optimal functioning of these high performance carbon filters can be further enhanced by removing all polluting particles before they reach the carbon filter. This happens by combining the carbon filter with electrostatic precipitation in the aircleaning process.

Conclusion:

Within a patient-centered care policy of a hospital, patients, particularly those with respiratory conditions or compromised immune systems, benefit immensely from improved air quality. Healthcare facilities that prioritize air quality create a more conducive environment for healing and recovery. As clean air contributes to the pursuit of providing exceptional medical care, healthcare facilities must recognize the pivotal role of air quality mainly in high-risk care zones, and departments with a higher potential of VOCs. A commitment to maintaining clean and healthy indoor air can lead to improved patient outcomes, enhanced patient and staff well-being, and a more conducive healing environment. EPF is highly effective at removing particles from gas streams, including fine and ultrafine particles, which can be challenging for other filtration methods. Activated carbon is known for its versatility in adsorbing a wide range of pollutants, including volatile organic compounds (VOCs), odors, gases, and chemical contaminants. However, they typically need periodic replacement

By integrating cutting-edge air decontamination technologies such as electrostatic precipitation filtration and the use of effective active carbon collectors which removes potential airborne pathogens, dangerous gaseous compounds, and smells, the benchmark for healthcare facilities to ensure a healthy air environment for all stakeholders is set.

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The European Respiratory Cluster Antwerp (eu.reca) is a dynamic knowledge platform with a focus on the lung. In order to improve therapies and quality of life of patients, develop new products, reduce societal costs and deal with the challenge of air pollution, we believe it is necessary to connect and unite all stakeholders in an expert community.

"As a catalyst for innovation, we want to bring promising start-ups into contact with leading companies, pharma with product designers, academics with entrepreneurs, and investors with patients. That is why our approach is based on interaction. Our extensive network ensures a quality pool of participants. Our workshops and symposia encourage in-depth dialogue." Frank Pieters, Founder and Chairman of the Board.

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