CONSIDERATIONS ON THE SPRAYING AND NEBULIZATION OF CHEMICALS IN ENCLOSED SPACES

GENERAL CONSIDERATIONS

Biosafety requirements for contamination by infectious agents in enclosed places vary, depending on the nature of the space, the activities undertaken there, the risks involved and the materials that are handled in each workspace, whether for health or day-to-day activities.

The precautions that must be taken in clinical-surgical spaces, laboratories, or places at high risk of contamination by viruses or bacteria are different from those appropriate for homes, residential spaces, or closed office workspaces. The risks vary and the needs for disinfection and cleaning are also different.

For highly contaminated spaces, or those with risks of potentially dangerous infectious agents, different processes of disinfection can be carried out, including manual disinfection, chemical spraying, and the nebulization of disinfection chemicals.

- The most recommended way of cleaning and disinfecting surfaces in general is manual, using appropriate cleaning or chemical products applied in a manner and schedule that guarantees decontamination. The direct application of products onto surfaces can guarantee their efficacity, depending on the concentration, effectiveness, and contact time relationship.
- Spray equipment generates microdroplets that are deposited on surfaces in the form of a mist containing chemical products. This is the recommended method for inert surfaces, because it acts only where the product has contact with the surface and tends to moisten or wet the surfaces; even cardboard and paper can be affected. This system is used on large surfaces and mainly outdoors, since residues of the applied product remain on the surfaces for considerable periods of time. It is not recommended for use on people or in areas where people stay or circulate.
- Nebulization of chemical products is used for enclosed spaces, where the risks of contamination are high and in which some areas could be difficult to access, such as ceilings and corners. It is also advised for situations where the transmission route justifies it. The products are sprayed, or diffused, in such a way that they remain suspended in the air, within the space where they are applied, so avoiding the generation of high humidity loads that could damage equipment or elements within the nebulized space.
- People applying chemicals, either by direct application, spraying or nebulization, should always have adequate personal protective equipment PPE (respirator, goggles, waterproof gloves, waterproof boots, resistant gowns/overalls) to avoid irritation, injury, or poisoning due to exposure.
- Nebulization of chemical products for disinfection is not recommended for:
    - Contaminated spaces that cannot be sealed or where people are present or in transit. This is imperative while the chemicals are in active use and until any residual effects of the products have disappeared;[1]

[1]The re-entry or residuality period is defined at the time necessary for the concentrations of the chemicals used to decrease their presence in air or surfaces, so that they do not create any risk of irritation or intoxication in people.

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- Places where consumer goods, food, and water are kept;
- Spaces with centralized ventilation systems, because of the risk of the chemicals being dispersed into areas that are not to be disinfected.

THE APPLICATION OF CHEMICALS THROUGH NEBULIZATION

- Nebulization is an expensive procedure and is not indicated for open spaces, where air circulates or in which people must transit or remain during the application of the products.
- For the nebulization to be effective, it is essential to maintain the specific concentration of the disinfection chemical within the environment for a prolonged period.
- It is necessary to respect the application times, concentrations, propellants, re-entry, or residual periods of chemical products, in order to be able to reuse the spaces without risk to human health.
- Not every chemical used for disinfection is safe for the specific places where it is to be applied. Some chemicals are corrosive to some surfaces or metals. It is essential, therefore, to verify carefully the type of product and the surfaces to which it is to be applied.
- Some chemicals may have a residual effect, the contact with which could give rise to potential risks of poisoning, irritation or injury. Some products have a high residuality and can affect the health of people who enter any space that still has traces of the chemicals in suspension, or on contact surfaces, unless they have adequate protection.
- The rational use of chemical products requires an analysis of the benefit of using the product by means of spraying or nebulization, versus direct use on surfaces.

CHARACTERISTICS OF CHEMICALS TO BE NEBULIZED

- Only use products that are recognized as being effective for disinfecting spaces and surfaces. Not all chemicals used manually for disinfection, such as with a cloth, mop, or spray, are applicable or equally effective when nebulized.
- Always check the label for information on the dangers and precautions for use, as well as the personal protection equipment recommendations.
- Do not mix chemicals used for disinfection with soaps or other cleaning products. Dangers of improper mixing include corrosion, as well as the explosive or incendiary potential of the product.
- Do not nebulize the products when there are people present, or in transit, who are not adequately protected in order to avoid the risk of irritation, injury or poisoning.
- Ensure the cleanliness of the surfaces to be disinfected, since the effectiveness of the disinfection process depends on such cleanliness; it is much lower on surfaces covered in dust or other residues than on a cleaner surface.

CARE CONSIDERATIONS FOR RETURNING TO WORK IN ENCLOSED SPACES

- After 2-3 weeks with no occupants in office spaces or buildings without high biological risk,[2] there is no risk for SARS-CoV-2 transmission. The virus survival time on inert surfaces or materials is a maximum of 9 days, depending on the type of surface.
- The SARS-CoV-2 mode of transmission determines that emphasis must be given to cleaning and disinfecting high contact surfaces.
- If surfaces have not been cleaned regularly for some time, adequate sanitization is recommended for other risks such as fungi, bacteria, dust or mites, depending on the risks previously determined for the area.
- Reactivation of air conditioning systems will require adequate cleaning of the air filters and prior ventilation of the system, considering that the methods used may vary depending on the type of equipment. Cleaning a closed circulation central air conditioning system is different from cleaning an individual one.
- Items such as rugs, chairs and other furniture, with highly porous surfaces, must be cleaned with appropriate sanitization products.
- Self-care and physical distancing rules must be respected during working hours.

SPECIAL CONSIDERATIONS FOR SARS-CoV-2

- SARS-CoV-2 is primarily transmitted between people through respiratory droplets and contact routes, and as such the PAHO / WHO recommendations focus on the cleaning and disinfection of surfaces.
- Nebulization using chemical products for disinfection is not recommended in low risk spaces. Risks associated with enclosed spaces should be reviewed, such as air conditioning systems that have been off for long periods of time or rugs without sanitization.
- The air flow from air conditioning systems in enclosed spaces must be considered in the reorganization of workspaces, as well as the rules for physical distancing and the use of masks.

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[2] Spaces with high biological risk are those that due to their characteristics, developed activity or conditions present risks of having circulation of pathogens as biological risk areas in health facilities, slaughterhouses, or live animal markets, among others.