Dark past or bright future?

In case of certain pathogens, costly disinfection measures were still performed in the 90s of the last century using formaldehyde – a so called "sandwich method" consisting of wipe disinfection and nebulization. The spreading of aldehydes created additional challenges for occupational safety because regular-like side effects led to mucosal irritations for the disinfecting personnel. Consequently, the nebulization was abandoned.

Legal position

The legal position in the field of disinfection is basically characterised by mandatory requirements of the "Biostoff-Verordnung" and "Gefahrstoff-Verordnung" including its associated technical rules (TRBA / TRGS). Both regulations follow the principle of risk minimization.

Employees should only be exposed to a minimal risk of microorganisms, virus and chemicals. Compromises based on a risk assessment need to be made taking "BGR 206" and "BGR 208" into account. There is no prohibition of nebulization if people are not exposed to the resulting aerosol. Other issues of surface disinfection are regulated in the set of technical rules for hazardous substances (TRGS 525). In addition, there is a substitution requirement which says, less hazardous substances are preferred to more dangerous ones.

Preparations and technique of nebulization

The principle of nebulization is the use of disinfectants using pressure and suitable nozzles is mechanically transformed into a fine aerosol. The preparations being nebulized, must meet the following conditions:

- Concentrate: not containing or containing just a minimum of health-adverse factors according to "Gefahrstoff-Verordnung"
- non-flammable, no explosions;
- not leaving any residues on surfaces
- no residues in textiles or ambient air
- Effectiveness even under less clean surface conditions (eg protein load)
- Remanence effect, if possible

These criteria are satisfied with hydrogen peroxide (H_2O_2). By adding silver ions, the effect and the sustainability are being enhanced. The application of a ready-to-use solution and the spreading via timer (excluding employees in the room) provides maximum safety against health-related harm.

Why can nebulizing make sense?

In case of infection outbreaks, a complete surface disinfection is naturally of particular relevance. Unfortunately, in daily practice, it is stated again and again that there is a lack of well-trained staff. Thus, disinfection work cannot be carried out with the necessary thoroughness (especially forgetting small areas). In the past this led to outbursts like pan-resistant Acinetobacter baumanii. In some health care establishments there are areas that can not be manually disinfected such as carpets.

According to "Biostoff-Verordnung" there is a clear demand for protecting personnel against micro-organisms and viruses as well as possible. In the context of a final disinfection (discharge or transfer of patients / residents) this results in two indications for nebulization:

- In case of suspected contamination, the DiosolGenerator should be used before scrubbing and wiping disinfection. For this purpose, a timer-controlled nebulization generator needs to be put in the respective room. After connecting to the power supply, the device can then

carry out a first disinfection without further human intervention. This way, the requirements of “Biostoff-Verordnung” are met.

- After a scrubbing and wiping disinfection, the DiosolGenerator can be used to significantly reduce the contamination of poorly reached surfaces once more. This may be an important aspect of infection prevention, especially in the outbreak management.
- In clean rooms to minimize work-related recontamination through disinfection personnel as employees constantly emit bacteria from their flora, despite protective clothing.

Requirements for aerosol disinfection

Contemporary aerosol disinfection methods guarantee that disinfection generators and disinfectants to be used are optimally matched. Ready-to-use disinfectants must be sufficiently stable for storage. The exposure time must be in workable framework, values up to 120 minutes are acceptable. Microbial efficacy must be tested according to EN-standards. A success must also be documented. Demanding a mandatory listing at „Verbund für angewandte Hygiene (VAH)“ is legally impossible. In any case, the corresponding expert reports should be available at the facility using the aerosol disinfection. According to § 3 IfSG, the supervisory authorities have the right and the duty to verify these expert reports. The nebulization device must be programmable to accommodate different room sizes and liquid consumptions. After programming and placing it in the room, the nebulization device has to do its work without any human intervention. This involves the generation of a fine aerosol sedimenting on all surfaces. By contact with micro-organisms and viruses, it can exert its effect. A missing or insignificant protein error and a good penetration into the remains of blood and body secretions are useful.

What can aerosol nebulization achieve? –
Experiences from laboratory and field

An aerosol disinfection system with a ready-to-use disinfectant and the associated device (DiosolGenerator) has been tested by independent experts. First, the reduction factor was determined by using specimens. The specimens (tiles) were loaded with 1% erythrocytes and 1% albumin. This corresponds to three times the demand for high-VAH load when testing disinfectants. In this testing, reduction factors between 2 and 5 were obtained. In field studies the system was used for disinfection in nursing homes and ambulance vehicles. In this case, an average bacteria reduction between 75 and 99% was detected. This corresponds to the information provided by KRINKO / RKI recommendations concerning the demands of hygiene for “cleaning and disinfection of surfaces”.

Institut Schwarzkopf GbR
PD. Dr. med. habil. A. Schwarzkopf
Medical specialist for microbiology and infectious epidemiology
Publicly appointed and sworn expert for hospital hygiene

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